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ABSTRACT

Alternatives to current provincial policies and procedures relating to school construction and its funding are identified and examined. The report sets out findings and recommendations in four sections. In the first section, School Facility Planning, Policies, and Procedures, school building is proposed as an integral part of shared community facilities. Various stages in the evolution from simple school house to sophisticated community facility are discussed. Section 2, School Population Projections, recommends the assessment of the most likely economic prospects for Alberta and an economically induced population forecast. A second task is seen as the development of the processes for disaggregation and dimensioning of projected provincial population changes into a regional context for each of the ten regional planning areas. Section 3, Sharing, Acquiring, and Disposing of Facilities, discusses the advantages and disadvantages of sharing facilities with other public organizations and also private enterprise. The various methods of acquiring facilities are examined. In section 4, School Facility Funding Alternatives, four new funding mechanism alternatives and a recommended utilization mechanism are examined. (Author/MLF)

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SCHOOL FACILITY LOGISTICS

A STUDY FOR ALBERTA EDUCATION

DEALING WITH SCHOOL PLANNING, ACQUISITION, AND FUNDING ALTERNATIVES

By

Woods, Gordon & Co.
Management Consultants

in association with
The Brooker
Engineering Group Ltd.

FEBRUARY, 1977

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i) An Extensive Annotated Bibliography,

ii) A Project Library of 60 Current Publications on School Building and Funding, and

iii) A Summary of the Woods, Gordon & Co. Survey of School Facilities

has been turned over to the Library of

Alberta Education

By

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February 22, 1977

Dr. W. E. Hathaway
Education Consultant
Planning and Research Branch
Alberta Education
Executive Building
10105 - 109 Street
Edmonton, Alberta
T5J 2V2

Dear Dr. Hathaway: Re: School Construction/Construction Funding Study A0815

It is a privilege to present herewith, our final report for your consideration. We believe that we have satisfied the original terms of reference which were to identify and examine current Provincial policies and procedures relating to school construction and its funding. In fact, we have pursued our examination further particularly with respect to the concept of the community facilities and the planning process.

The purpose of the study was to identify and examine alternatives to current Provincial policies and procedures relating to school construction and its funding.

Major areas of attention were construction policies, planning structures, alternatives to construction, and funding formulae. To accomplish this purpose it was necessary to re-examine historical patterns, demographic trends, (particularly shifting population patterns), and building alternatives. Particular attention was paid to the interactions of these factors, especially the long-term implications. The present has been used as a springboard to the future.

The generosity of educational facilities provision across the province continues to impress us. The per capita expenditure is above the Canadian average and the standards of space and environments in the buildings themselves are excellent. The Building Quality Restoration Program (BQRP) appears to be administered effectively and is obtaining good results. In these areas we have no cause to recommend changes and can only hope such standards can be maintained in the face of rising costs.

Of immediate concern is the degree of delay and confrontation caused by the present planning process where provincial control is exercised at the stage of inspection of plans. We feel that the School Buildings Branch should place less emphasis on plan inspection and become more involved as advance planning advisors. Provincial input should be transferred from that of plan approval in prescriptive detail to upfront involvement at a much earlier stage in the planning process.

Another concern is that of empty desks caused by demographic shifts. As this trend will continue into the foreseeable future, we felt obliged to present for your consideration (and ultimately before the local school boards for their consideration) the widest possible spectrum of building alternatives - alternatives which will enable you to operate an educational system, catering wisely for growth, decline and/or relocation. This takes us beyond new permanent buildings, quality restoration programmes into prefabrication, leasing and adaptation of existing buildings to educational use.

Because these solutions still failed to provide the necessary flexibility, we took a fresh approach by asking - when is a school not a school? Answer: when it's a community facility. Should we be thinking of the school building as an integral part of shared community facilities?

At this point, planning takes on a whole new dimension. In order to pursue the community facility concept, you need a planning mechanism to support and service it. The first step should come at the provincial level. We have already recommended that more emphasis be placed on advance planning, working with local school boards at a much earlier stage of the planning process in a spirit of mutual respect.

This planning advisory function should be extended, and we recommend the setting up of a Community Facilities Planning Group, with a small but highly professional staff to act as a technical resource willing and able to encourage and assist local boards in the kind of planning that will provide accomodation responsible to the changing needs of local communities over the lifetime of the facilities.

Local boards would shoulder the primary responsibility for planning and implementation. Initially, any group in the community which hoped to contribute to or benefit from the construction of a community facility would be consulted. In the longterm, these participating groups would be represented on the local board. It is conceivable in time that this expanded local council (the term school board being no longer applicable) would become an integral component of the elected political structure.

The school plan would involve not only the school facilities within the jurisdiction of the local school board but also the creation of purpose-built community facilities. Perhaps multi-facility plan would be a more accurate description.

We must look at a realistic time-frame for these changes. To realize the full implications of providing a community facility, a new planning horizon is essential. Plans must be prepared at two levels:

long-term and short-term. By long-term we mean looking 25 to 30 years ahead; short-term means 3 to 5 years. Every multi-facility plan must include both types of plans.

In the body of the report, we discuss the various stages in the evolution from simple schoolhouse to sophisticated community facility. As we look ahead in time, the terminology, as already indicated, must change to accommodate new modes of thinking. To avoid confusion, we supply the following glossary of terms:

Existing Designation	Possible Future Alternative
School	Community Facility
Local School Board	Local Council
Multi-School Plan	Multi-Facility Plan
(The appropriate clustering of elementary and secondary schools.)	(Appropriate clustering of community facilities.)

The report sets out our findings and recommendations in detail in four sections:

I. School Facility Planning, Policies and Procedures
II. School Population Projections
III. Sharing, Acquiring and Disposing of Facilities
IV. School Facility Funding Alternatives

Our main recommendations are summarized below.

I. School Facility Planning, Policies and Procedures

The recommendations are divided between structure and process as follows:

The Planning Structure

We believe that Alberta Education should:

1. Continue to encourage the devolution of the responsibility for all planning and implementing to the local school board.

2. Develop the Community Facilities Planning Group as a staff technical support team for:

   a) developing guidelines (for local school board's use) for all elements of the facility other than those of a pedagogical nature,

   b) monitoring results,

   c) technical input as required, at all stages of the planning process,

   d) encouraging long-range planning, and local community involvement.

   The Community Facilities Planning Group should, for the present, reside in Alberta Education although in the longer term, a broader planning perspective could possibly be developed if it was made accountable directly to Executive Council.

3. Retain, for now, its responsibilities with respect to funding and approval of plans. This should be reviewed in the future, however, along with the role and accountability of the Community Facilities Planning Group.

The Planning Process

1. Provincial input should be transferred from that of plan approval in prescriptive detail to an upfront involvement in the early planning process.

2. The prescriptive detail in the school building regulation should be converted to guidelines, and should be subject to change by the Province in response to changing educational methods and techniques.

3. Province-wide school building regulations should provide for greater individual consultation with local school boards regarding their long-term and short-term multi-school plans.

4. The School Buildings Branch and School Buildings Board should become more involved as advance planning advisors.

5. The Community Facilities Planning Group must reflect the action plans of other government departments including the Alberta Departments of Culture, Parks Recreation and Wildlife, and Housing and Public Works.

6. Provincial government policy and guidelines should be integrated with the objectives of the local school board through a disciplined planning process. The local school board should then have autonomy for discretionary flexibility within the general limits of the long-term and short-term multi-school plan.

7. Each local school board will give first priority to the development of a 3 to 5 year community facilities plan and will invite the Community Facilities Planning Group to participate in the planning process.

8. The plan will be based on the best long-range demographic studies available looking 25 to 30 years ahead.

9. Community facilities should reflect flexibility as a dominant parameter of design for the uncertainties of our mobile society.

10. The ability to expand or contract is a necessary characteristic of a community facility in responsible planning for large expenditures of money.

11. School facility planning must now become part of community facility planning, which is part of neighbourhood planning, a component of municipal planning, a concern of the Cabinet Committee on Social Planning of the Government of Alberta.

12. The approach to school accomodation should change from exclusive, dedicated academic use to a community facility approach which will enable the facility to provide shared community needs.

II. School Population Projections

Population forecasting is obviously the most critical determinant for establishing school facility requirements. It is difficult to forecast at the best of times, but it is particularly so in Alberta with its high rate of in-migration and population shift. From July, 1974 to July, 1975, Alberta's population grew by 3.2 percent (compared with 1.6 percent nationally) to an estimated 1.77 million. This rapid population growth coincided with an increasing concentration of Alberta's population in the Edmonton and Calgary areas. The effect has been a rapid population increase for metropolitan areas, slow growth for most other towns, and a general decline in rural areas.

The Alberta Bureau of Statistics makes available population projections based on demographic criteria. Unfortunately, forecasts based solely on demographic criteria are inherently weak and unreliable over even short time periods. This is especially true of areas with changing economic and urban-industrial conditions such as Alberta.

An important task, then, is to assess the most likely economic prospects for Alberta and to arrive at an economically induced population forecast. A second important task is development of the processes for disaggregation and dimensioning of projected provincial population changes into a regional context for each of the ten Regional Planning Areas.

III. Sharing, Acquiring and Disposing of Facilities

The report discusses the advantages and disadvantages of sharing facilities with other public organizations and also private enterprise. It is concluded that there are significant advantages to be gained from sharing facilities.

The various methods of acquiring facilities are examined. These include:

- the construction of new permanent buildings - ranging from the traditional (tender and contract) approach to the systems building approach,
- the installation of transportable units or other forms of relocatable or disposable facilities.

In addition, facility renovation and/or addition and disposition are examined together with the questions of leasing. Discussion of pupil transportation and information dissemination takes place in Appendices VII and VIII.

The report points out that school boards should be encouraged to analyze all the foregoing building alternatives for each project, taking into account a long-term forecast, population shift, time elements, pupil access, zoning, etc.

The report describes the core school concept and its advantages in providing good pupil accommodation when there is uncertainty about potential enrolments. School facility planners should continue to use this concept.

The most stifling effect of the established planning procedures is the emphasis it places on the individual school projects, and the short-term nature of the forecast of needs. The procedure encourages a school board to isolate each project at as early a stage as possible, and to think only in terms of the first short period of the school's existence - a period normally associated with growth. In this environment, it is natural for a school board to become caught up in the excitement of producing a note-worthy building each time the opportunity arises. The system tends to constrain, and be narrow in its approach.

More emphasis should be placed on multi-school, multi-level, multi-departmental planning at an early stage, and this planning should look as far into the future as possible.

Broad long-range conceptual planning, and the development of master plans are required.

IV. School Facility Funding Alternatives

The study found that the existing school funding mechanism is not a major factor contributing to present planning deficiencies and may be left unchanged for the short-term. The report recommends that the debenturing process for financing the capital cost of school construction be continued, but a suitable mechanism for determing the split between the local and provincial share of the costs be developed.

Four new funding mechanism alternatives and a recommended utilization mechanism are examined:

Funding Mechanisms

1. A Local School Construction Levy to a Specified Maximum Mill Rate.

Under this system, each school district would be required to finance the annual cost of its own new schools to a specified maximum mill rate applied to its equalized property assessment value. Any deficiency in meeting the approved construction costs would be made up by the Province.

The levy would be identified clearly as a "school construction levy" in order to differentiate it from the existing 26 mill non-residential levy which helps finance the School Foundation Program Fund. Costs over and above the approved construction cost level would continue to be provided from an optional local assessment.

2. Limit Provincial Funding to the Reciprocal Percentage which the Local Equalized Assessment Base Bears to the Total Provincial Assessment Base.

Under this mechanism, the approved construction cost of new facilities is first calculated on a square footage basis as under the existing method. Whereas existing funding arrangements call for the Province to support debentures for the total amount of these approved costs, this proposal would limit the provincial support at the reciprocal percentage relationship which the local assessment base bears to total provincial assessment. For example, a large relatively wealthy district having 25% to total provincial assessment would be supported to the 75% level of approved costs. A much smaller district, having only 1% of the provincial total assessment, would receive 99% of the approved cost of its construction program.

3. Change the Existing Square Footage Support Rates to Reflect a District's Ability to Pay.

A simple way to shift school construction costs to the local boards would be to lower the provincial support level to something less than 100% of the approved costs or by lowering the approved costs themselves by paying a lesser percentage of the existing standard square footage construction cost rates. To be equitable, however, such a reduction in the percentage should not be uniform for all districts as this would only heighten the disparity which now exists between the individual boards' abilities to provide facilities over and above the floor level supported by the standard rates. A fairer means of determining a district's provincial support rate would be based on the reciprocal percentage that local assessment for that district bears to total provincial assessment. This is simply a variation in application of the formula used under Alternative 2.

4. Shift Full Responsibility for the Provision of School Facilities to the Province.

Under this funding mechanism alternative, the prime responsibility for providing and maintaining suitable physical facilities would be removed from the local boards and vested in an appropriate government department, either within or outside of the Department of Education.

Such a step would, in no way, be intended to infringe upon the boards' existing level of authority in establishing and operating educational programs. The local boards would still be responsible for the definition of need for educational facilities. It is only the actual construction or modifications in response to the definition of need that would be shifted to the Province. The relationship between local boards and provincial authorities and the responsibilities of each in ensuring that proper school facilities were available where required would need to be defined clearly as part of the planning process.

With the actual construction of facilities being managed centrally by the Province, the Province would also undertake to finance all capital costs completely from provincial revenues and ownership of the facilities would remain with the Province.

Utilization Mechanism

The study identified a need for the development and application of a utilization mechanism to prevent overbuilding in school facilities. The suggested method is to tie provincial support to the rates of existing student spaces to enrolment projections through the introduction of a utilization ratio which would decrease the support eligible to any district which already has excess space according to the ratio chosen.

The mechanism may be based on the ratio of the total school spaces in a district to the maximum enrolment projected in the next few years in that district. In order to permit the required flexibility for the type of space required it may be necessary to compute separate ratios for elementary, junior high school and senior high school sections and to incorporate some flexibility for specialized curricula. Under these space controls the Province would refuse to provide any support to a local board requesting additional space which would cause its relevant space to enrolment ratio or "control ratio" to exceed the established maximum.

The degree to which the Province would support the capital funds which qualify under these constraints could be further refined depending upon how closely a district's control ratio approached the maximum amount over which no provincial funds would be forthcoming for further facilities. For example, if the maximum control ratio were set at 1.25 to 1, the Province would provide no support for construction in a district where this ratio was already exceeded. It would further be established that a district having a ratio between 1.25 and 1.20 to 1 qualified for 50% provincial support based on approved capital cost requirements. A ratio of 1.15 to 1.20 might qualify for 75% support and any ratio below 1.15 would receive 100% provincial support.

Consideration of these alternatives clearly shows that no funding mechanism, in itself, can substitute for the need for sound school facility planning. Cognizant of this the report recommends that Alternative No. 3 together with the proposed utilization mechanism present the best choice for the future. It is recommended, therefore, that Alberta Education:

1. Change the existing square footage support rates to reflect a district's ability to pay. The ability to pay should be based on the reciprocal percentage which the local equalized assessment base bears to the total provincial assessment base and the square footage support rate to be applied to a particular district should recognize differences in local construction costs and other specific circumstances which affect that district relative to provincial average costs.

2. Tie provincial support to the rates of existing student spaces to enrolment projections through the introduction of a utilization ratio which would decrease the support eligible to any district which already has excess space according to the ratio chosen.

Conclusion

We recognize the significance of our recommendations. We also appreciate the difficulties that will have to be overcome to make them work. However, if they are accepted, we believe that, in time, the efficiency of the educational facilities provided for the citizens of Alberta, in the broadest sense of the word, will be greatly improved.

We very much appreciated the opportunity of working with you and your colleagues on this assignment. We are most thankful to you all, as well as the other informed people, (see Appendix I for list of those interviewed) who were kind enough to give us their views.

Yours very truly,

Woods, Gordon & Co.

M.J. McClew -Partner
A.E. Gourley -Partner
P.G. Wilkes -Partner
R.C. Short -Principal
J.D. Walls -Principal

SECTION I

SCHOOL FACILITY PLANNING, POLICIES AND PROCEDURES

SCHOOL FACILITY PLANNING, POLICIES AND PROCEDURES

In this Section the planning concept is discussed and recommendations are made with respect to the planning structure and process. Further, the role of the local school board is examined as is the school facility as an integrated part of community facilities.

A. THE PLANNING CONCEPT

The combination of a shifting population and a declining birthrate will continue to make stringent demands upon the resources and resourcefulness of Alberta Education. Alberta's per capita expenditure in the field of education is well above Canadian and North American averages. School building space and environment standards compare favourably with those of other Canadian provinces.

Educational facility provision, however generous, solves nothing unless it is available in the right place, at the right time. The crux of the matter is knowing where to build, when to build and what to build. Effective planning is essential to ensure the continuing success of the system as a whole and its survival as a viable economic entity. We identify the need for:

1. A new planning process, specifically, the setting up of a Community Facilities Planning Group at provincial level to facilitate early and effective consultation with local school boards long before the plans reach the drawing board.
2. A new planning horizon looking 25 to 30 years into the future which faces up to the implications of a shifting and declining pupil population and looks beyond the four walls of the traditional school at the reality of a community school and towards the possibility of a purpose-built community facility where school needs are met as an integral part of total community needs.

Planning is discussed in detail under the following headings - Recommendations. School Facilities as Part of Community Facilities and Role of the Local School Board.

B. RECOMMENDATIONS

a) THE PLANNING STRUCTURE

We believe that Alberta Education should:

1. Continue to encourage the devolution of the responsibility for all planning and implementing to the local school board.

2. Develop the Community Facilities Planning Group as a staff technical support team for:

   a) developing guidelines (for local school board's use) for all elements of the facility other than those of a pedagogical nature,

   b) monitoring results,

   c) technical input as required, at all stages of the planning process,

   d) encouraging long-range planning, and local community involvement.

   The Community Facilities Planning Group should, for the present, reside in Alberta Education, although, in the longer term, a broader planning perspective could possibly be developed if it was made accountable directly to Executive Council.

3. Retain, for now, its responsibilities with respect to funding and approval of plans. This should be reviewed in the future, however, along with the role and accountability of the Community Facilities Planning Group.

b) THE PLANNING PROCESS

1. Provincial input should be transferred from that of plan approval in prescriptive detail to an upfront involvement in the early planning process.

2. The prescriptive detail in the school building regulation should be converted to guidelines, and should be subject to change by the Province in response to changing educational methods and techniques.
3. Province-wide school building regulations should provide for greater individual consultation with local school boards regarding their long-term and short-term multi-school plans.
4. The School Buildings Branch and School Buildings Board should become more involved as advance planning advisors.
5. The Community Facilities Planning Group must reflect the action plans of other government departments including the Alberta Departments of Culture, Parks Recreation and Wildlife, and Housing and Public Works.
6. Provincial government policy and guidelines should be integrated with the objectives of the local school board through a disciplined planning process. The local school board should then have autonomy for discretionary flexibility within the general limits of the long-term and short-term multi-school plan.
7. Each local school board will give first priority to the development of a three to five year community facilities plan and will invite the Community Facilities Planning Group to participate in the planning process.
8. The plan will be based on the best long-range demographic studies available looking 25 to 30 years ahead.

9. Community facilities should reflect flexibility as a dominant parameter of design for the uncertainties of our mobile society.

10. The ability to expand or contract is a necessary characteristic of a community facility in responsible planning for large expenditures of money.

11. School facility planning must now become part of community facility planning, which is part of neighbourhood planning, a component of municipal planning, a concern of the Cabinet Committee on Social Planning of the Government of Alberta.

12. The approach to school accommodation should change from exclusive, dedicated academic use to a community facility approach which will enable the facility to provide shared community needs.

C. SCHOOL FACILITIES - AS PART OF COMMUNITY FACILITIES

We believe that there is a need, now, in Alberta for a new approach to planning community facilities for education and recreation. The Alberta Government has a right and a duty of accountability to the public commensurate with its share of funding of school facilities. However, at present, this control is being exercised in response to individual statements of need by local school boards and consists largely of the detailed inspection and alteration of school board plans relatively late in the planning process. Because of the inherent nature and structure of this control mechanism, confrontation results between school boards and Alberta Education as the availability of required new school accommodation is delayed by the process and an excess of school facilities develop where they are not needed.

Our field survey and interview program showed the following:

1. Alberta can take pride in its commitment to education with per capita expenditures by the Province and local school boards well above Canadian and North American averages.
2. Alberta's school building standards are satisfactory when compared with other jurisdictions.
3. The Building Quality Restoration Program is obtaining good results and is being effectively administered by the School Buildings Board through the School Buildings Branch.

Our study also, however, revealed the following:

1. It is estimated that about one-quarter of present school facilities are vacant due to declining and shifting population, and yet, new schools are needed in new places. Flexibility and

individual planning consultation with individual school boards is, therefore, necessary to accommodate the mobility of Albertans and the widely varying needs between school boards.

2. Federal and Provincial Government programs, such as the Core Housing and Incentive Program (CHIP) to encourage new housing, have a direct bearing on the needs for school facilities and must, therefore, be taken into account in the planning process. Similarly, the policies of the Provincial and Municipal Governments, with regard to the responsibilities of developers for cost sharing new services, also affect the rate and staging of new housing developments and hence the generation of need for new school facilities.

3. A positive dedicated thrust for broad community use of public buildings, including schools, is now an operating necessity because of the high cost of providing such facilities, and the need to develop comprehensive facilities that will provide a focus for the community.

4. Certain sections of the existing school building regulations are too prescriptive and discourage local school boards, their architects and builders from applying creative techniques aimed at lowering building costs.

We, therefore, believe that the existing planning process for the provision of school facilities requires very substantial change to meet the current and future needs of the province and that this revision of the process should be undertaken without delay.

School facility planning must now become part of Community facility planning, which is part of Neighbourhood planning, a component of Municipal planning, a concern of The Cabinet Committee on Social Planning of The Government of Alberta.

Unilateral action in any one of these planning areas, in isolation from the others, must be replaced by cooperative consensus.

Although we believe that there is a need for a stronger community facility planning process, we believe that it is important that local autonomy be strengthened to ensure that varying local needs are adequately served. The Provincial role should, therefore, be to assist local authorities to whatever extent is necessary to ensure that a uniformly effective planning process is followed throughout Alberta and that best value is obtained for the expenditure on school and community facilities. The school boards in Edmonton and Calgary have the resident expertise to plan their facility needs in a sophisticated way whereas smaller boards, that build new schools only very infrequently, do not have the same level of expertise. They could, therefore, benefit greatly from professional planning guidance from the Provincial Government.

The Provincial Government should also encourage cooperation between school boards and Municipal Governments in planning community facilities that serve, among other things, educational needs. These local authorities, however, often need assistance in dealing with the variety of Provincial Government departments that must be dealt with in the planning, building and financing of community facilities.

To facilitate such a planning process, we believe that the Alberta Government should create a new Community Facility Planning Group. This Group should reside in Alberta Education at the outset. In the long-term it may be an advantage to make it accountable to Executive Council. Its function would be largely advisory. We believe that in order to function effectively, it should be able to:

- deal with the full range of existing and future government departments,
- take maximum advantage of the expertise in Alberta's professional community and universities as well as the participation of community groups in the planning process,
- expedite complex funding agreements between provincial government departments, municipalities and school boards.

This Group would be a resource in providing a high level planning expertise to school boards and municipalities, to the extent that they require it, to assist them with the preparation of plans for community facilities. This would include acting as a catalyst in ensuring the full cooperation of various government departments, such as Education, Advanced Education, Housing and Public Works, Recreation Parks and Wildlike and Transportation, and helping to maximize community involvement at the local level. The group would be expected to stress the importance of early contributions from these other groups to avoid delays and misunderstandings that could threaten the plan during implementation.

This group would also receive long-range plans looking 25-30 years ahead, at as early a stage as possible, and approve them as a basis for judging the merits of later submissions. Guidelines for approval should, however, be flexible to accommodate the varying needs of different communities.

Alberta Education's role in such an arrangement would be to set guidelines on:

- the characteristics required for various types of facilities to provide the educational program,
- pupil loadings,
- optimal net to gross standards,
- requirements for outdoor space,
- maximum and minimum sizes of schools,
- standards for time and distance for busing or other forms of pupil transportation,
- net square footage standards for each type of space,*
- environmental conditions,*
- zoning of the province into areas to account for variations in construction costs.*

Alberta Education would review multi-school plans and offer suggestions for improvement during their development. It would also review individual school plans for conformity with its guidelines and for the purpose of continually reviewing its guidelines for improvement.

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* See Appendix III for detailed discussion of these points.

D. ROLE OF THE LOCAL SCHOOL BOARD

Local Boards of Education should include representation from those community groups who would wish to utilize the facilities. This expanded group should jointly agree on the planning and operation of the facilities. Responsibilities should be devolved to this group to the extent possible.

In order to take full advantage of the various options that might be available for the acquisition of facilities and to ensure that the planning process covers the broadest possible spectrum and public needs, the following steps should be included in the planning process.

1. Rationalization of school district boundaries.
2. Preparation of:
    a) long-term multi-facility plan(s) looking ahead 25-30 years,
    b) short-term multi-facility plan(s) covering the next 3-5 years.
3. Preparation of a "Statement of Needs" document for an individual school project within the terms of the long-range plans.
4. Selection of the best option for acquiring facilities for an individual school.
5. Preparation of a plan for acquiring facilities for an individual school.
6. Implementing the plan.

The principal activities and responsibilities involved in each of the above steps are as follows:

1. Rationalization of School District Boundaries

The Community Facilities Planning Group should advise on rationalizing boundaries to establish common boundaries for all community groups including political planning, health, recreation/parks, public and separate school. This will help to facilitate communications between all groups concerned with long-range planning at the community level.

2. Preparation of Multi-School Plans

The local school boards in consultation with other local community groups and with the assistance of the Community Facilities Planning Group would be responsible for the preparation of long-term (25-30 years) and short-term (3-5 years) multi-school plans within their jurisdiction. In some cases, one plan might incorporate all present and future schools within the school board's jurisdiction. In others, the overall area of jurisdiction might be subdivided into a number of smaller areas to facilitate the planning process.

Multi-school plans should be based on demographic projections, anticipated student enrolments, educational methods, community involvement, and should look as far into the future as possible. The plans should take into account the location, size, functional adequacy and physical adequacy of all of the existing school facilities within the area, and should include all levels of school facilities. The plans should also include the following specific elements:

- the location of all existing and proposed future schools,
- the degree of sharing of each school facility as between public and private organizations,
- the effects of future enrolment on the permanency of each school over time,
- the minimum and maximum sizes of each school over time,
- transportation implications,
- need to expand, contract or eliminate facilities at various points in time.

The multi-school plan should be accompanied by a document that indicates the source of data used in its development, and the degree of confidence that the Board has in the important elements of the plan.

3. Preparation of a "Statement of Needs" Document for an Individual School Project

School boards including representation from community groups who would wish to utilize facilities would be responsible for preparing a "Statement of Needs" document for each individual school project - as early as possible in relation to the agreed upon long-range plan. This document would contain the location of the proposed facility (whether existing or new), the type of program, anticipated enrolments (as far into the future as possible), the proposed number and types of rooms required at various points in time, the extent of sharing as between public and private organizations, transportation arrangements (where applicable) and all other factors affecting the need for facilities. The document would include the reasons why the statement of needs varied from the guidelines recommended by Alberta Education, and why there were deviations from the multi-school plan. In the latter case the board would indicate what changes (if any) should be made to other schools within the plan to update the details of the multi-school plan.

Alberta Education would be responsible for receiving the statement of needs document and approving it or offering suggestions until agreement can be reached on an acceptable document.

4. Selection of the Best Option for Acquiring Facilities for an Individual School

Once agreement had been reached on the statement of needs, the school board would be responsible for investigating all reasonable options for the acquisition of facilities to satisfy those needs over the long-term. The factors that should be considered in developing these options and comparing them are dealt with in this report under the heading of "School Building Alternatives - Selecting the Best Option".

The Community Facilities Planning Group with assistance from Alberta Education should be prepared to act as a resource on advising the school boards of the various options open to them, and to offer assistance in developing the options and comparing them on a systematic basis. Where liaison is required with other provincial government departments and agencies, The Community Facilities Planning Group should assist in expediting such liaison.

Alberta Education should ensure that funding mechanisms and planning procedures do not inadvertently favour certain options over others.

Finally, The Community Facilities Planning Group should review the comparative analysis carried out by school boards, and approve the method selected.

5. Preparation of a Plan for Acquiring Facilities for an Individual School

Once the school board and The Community Facilities Planning Group have agreed to the most appropriate method of acquiring facilities, the school board should prepare a plan for acquisition. This plan should be submitted to The Community Facilities Planning Group for approval.

6. Implementation of the Plan

In the case of new permanent facilities, core schools and renovation work, the procedure could follow the traditional procedures of acquiring a site, hiring an architect and preparing plans and estimates for approval at various stages of detail until contracts can be signed for the construction of the facility. Before this procedure is confirmed, the school board should examine the possibility of using construction management, project management, bid-design proposal or systems building techniques. Should any of these latter approaches be better suited than the traditional approach in individual situations, then the plan for acquisition should be designed to incorporate the best approach. Such a plan would require adjustments (and in some cases, shortcuts) to the usual step by step process of approvals by Alberta Education. Thus, when The Community Facilities Planning Group approves the plans for acquisition it would also approve the adjustments to the process. In accepting these adjustments Alberta Education should not relinquish the ability to review and approve the following submissions:

- multi-school plan,
- statement of needs,
- evidence that the statement of needs conforms with the Multi-School plan and Alberta Education guidelines.

The Community Facilities Planning Group should review and approve:

- evidence of a comprehensive comparison of all reasonable options for acquiring facilities,
- the plan for acquisition.

The review and approval of documents and cost estimates that are used as a basis for the signing of construction contracts or acceptance of proposals, should be the responsibility of the provincial funding authority. These responsibilities will rest with Alberta Education at the outset but may be transferred in the long-term to Executive Council.

School boards should be given freedom to seek out innovative approaches prior to the preparation of each of the above submissions. However, they should also be prepared to accept refusals or modifications by The Community Facilities Planning Group of any such school board submissions.

Adjustments to planning procedures are required where the plan for acquisition involves the participation of other public or private organizations, particularly if such organizations are involved in planning or in the provision of capital and operating funds. Adjustments are also required if acquisition involves leasing. In such cases, the six review and approval stages listed above are nevertheless still applicable. In addition, evidence should be required that all public or private organizations, prospective landlords or tenants that are to be involved with the use and/or funding of the facilities will be able to live up to their obligations over the length of agreements.

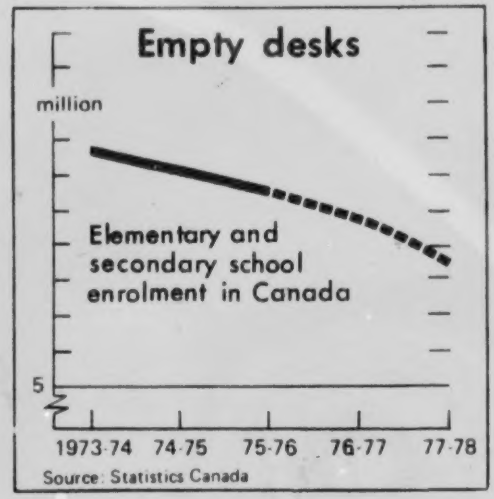
If you do nothing else, implement the following recommendation:

- provincial input should be transferred from that of plan approval in prescriptive detail to an upfront involvement in the early planning process. The School Buildings Branch and School Buildings Board should be planning advisors.

SECTION II

SCHOOL POPULATION PROJECTIONS

SCHOOL POPULATION PROJECTIONS



Source: Statistics Canada

Declining birth rates and Canadian immigration policy are generally lowering the elementary and secondary school enrolment across Canada. Canadians, however, continue to invest 12 to 13 billion dollars per year on education programs. The Organization for Economic Cooperation and Development stated recently that:

> Comparing Canada's figures with those of other countries, and though there is a marked downturn evident for the most recent years, one sees immediately that, in international perspective, Canada's allocations of resources to education have developed from a clearly generous level to an extraordinarily generous one.

Alberta is no exception - its per capita and per pupil expenditures are among the highest in North America. Problems with the availability of school facilities do not appear to result from an inadequate level of expenditure as much as the overall planning process to provide these facilities. We comment on various aspects of the planning process throughout our report, and suggest alternative policies and procedures in Section I.

SCHOOL STATISTICS

1. School Name: St. Joseph Junior High
   Address: 2512 - 5 St. NW, Calgary, Alberta

2. School Code: 8713

3. Region or School Board Code: Plant No. 9

4. Name of School Jurisdiction: Calgary Rcss. Dist. #0001

5. Main Building:

a) Age 1955
b) Number of Stories 2

	Additions	Type of Construction	Debentures Issued
1)	1964	concrete block	$ 226,089.53
2)			$
3)			$

6. Area of School Site. 2.89 acres

7. Debentures issued at construction: $________________

a) Date of Issue____________ b) Term _________ c) Annual Repayment(P&I)$____

8. Instructional Area Information:

	Type of Area	Number of Rooms	Total Instructional Area (Sq. Ft.)
a)	E.C.S.		
b)	Standard Classroom	8	6,758
c)	Science Experience Rooms	1	1,058
d)	Ancillary Classrooms		2,997
e)	Industrial Arts	2	2,990
f)	Home Economics	2	2,031
g)	Library	1	3,500
h)	Gym	1	
i)	Lunch/Study Room		
j)	Other (stage)	1	660
	Total	16	19,994
	Total Non-Institutional		18,431

Portables in Use	
1974 - 75	
1975 - 76	
1976 - 77	
1977 - 78	
1978 - 79	
1979 - 80	

Student Information

	Number of Students September 30	Grades Taught	Number Bussed	Community Use	
				User Numbers	Hours/ Week
1972-73	206	7-9			
1973-74	213	7-9			
1974-75	186	7-9			
1975-76	165	7-9	57		4
1976-77	142	7-9	49		
1977-78					

This section of our report describes the quantitative and qualitative school building needs in Alberta. Our major conclusions regarding these needs are:

1. As is widely known, the quantitative needs over the next few years will develop because of population shifts within the Province rather than increased pupil populations. In order to satisfy these needs, the planning process for school buildings needs to be refined and the best possible pupil population projections are essential to the process. Population forecasts should therefore, we believe, be prepared on an economically induced basis and should be broken down to the level of the regional planning areas.
2. Alberta's school building environmental and space standards compare favourably with those of other Canadian provinces and, on this basis, do not need significant revision.
3. Significant construction cost variations exist from region to region in Alberta and school funding, to be equitable, must take these variations into account. We believe that the best way for these variations to be measured is through a pragmatic approach of surveying the main parameters underlying these variations and setting an index based on the results to apply against Provincial standard allowances.
4. The existing school facilities could be conveniently described with a single data sheet for each page. An example (opposite) is taken from data received through our field survey (Appendix II). A loose leaf binder could be kept up-to-date for the

1,275 elementary and secondary schools annually in a manner similar to the Real Estate Board Multiple Listings, which are updated weekly.

A. SOCIO-ECONOMIC TRENDS

In recent years, Alberta has been experiencing high rates of population growth. From July 1974 to July 1975, Alberta's population grew by 3.2 percent (compared with 1.6 percent nationally) to an estimated 1.77 million. This rapid population growth coincided with an increasing concentration of Alberta's population in the Edmonton and Calgary areas. The effect has been a rapid population increase for metropolitan areas, slow growth for most other towns and a general decline in rural areas.

The 1973 Native population of Alberta was estimated at 65,000. Approximately 50 percent (31,362) were status Indians and the remainder were Metis or non-status Indians. Although demographic information on the latter two groups is imperfect, it is generally accepted that their numbers and demographic characteristics are similar to those of status Indians.

In 1974, the labour force grew by 32,000 to 750,000. Employment demand increased by 42,000 resulting in shortages of qualified workers throughout the economy. However, a reversal occurred in 1975 when the labour force outgrew employment by 8,000. The job vacancy rate declined substantially in 1975 when, on average, 15 jobs per thousand were unfilled compared to the 1974 rate of about 23 per thousand. Alberta's labour force participation rate, characteristically the highest in the nation, advanced marginally in 1975 to 61.7 percent. Potential developments in the oil sands and petrochemical industry, however, could once again lead to acute shortages of skilled labour.

Per capita personal incomes rose 15.5 percent in 1974. On the other hand, the distribution of income continued to be highly uneven. Rural and northern families have much lower average incomes than their urban counterparts. For example, families living in the area extending from Peace River to Cold Lake and from Lac La Biche to Drumheller had a mean family income below $5,740 in 1970, in contrast to a provincial average of $9,475 and a national average of $9,600.

Economic development will place significant demands upon the human resources of the province and western Canada in general. Alberta's skilled labour pool is too small to accommodate the demands of current and anticipated economic development. Since natural increased and existing levels of inter-provincial migration are not large enough to overcome this deficit, immigration and increased labour force participation will be relied upon to fill the gap. While immigration is expected to provide the bulk of new entrants to the labour force, increased participation rates are another possible source. The greatest opportunity for increased participation lies with Native people and females.

Industrial diversification will increase the number of jobs and the opportunities for vertical mobility in the labour force. New skills will be required. The skilled labour shortage, especially in construction, and the desire to have the current labour force participate in upward mobility will place demands on those responsible for training. High wages in the petrochemical industry are presently contributing to rising labour costs in all industrial sectors and causing rapid labour turnover as workers gravitate to petrochemical firms.

This shifting of significant groups of the population of Alberta requires close analysis since knowledge about the number and location of pupils to be served is crucial in school building planning.

B. ALBERTA POPULATION ANALYSIS

A number of population projections for the Province were assessed in terms of methodology, quality of assumptions and detail and the Alberta Bureau of Statistics reports appear to be the best of the available sources.

The Bureau completed a number of projections for the Province a few of which appear in the publication, Population Projections Alberta 1972-1985. They are the most up-to-date (completed in August 1975) and, in terms of methodology, are on par with Statistics Canada's projections. These projections were completed by what is known as the cohort-survival or component method of population forecasting. This method takes into account the effect upon a population that aging, future fertility and mortality rates and migration will have. Combinations of varying fertility and net migration assumptions have produced a number of possible projections. Thus, high, medium and low assumptions of future fertility rates have each been combined with high, medium and low net migration levels. The number of projections, therefore, permits the opportunity to select a 'most likely' range of population projections based on more recent data on fertility and migration in Alberta.

The area where these projections have weaknesses is in the net-migration assumptions. First, the age and sex composition of immigrants (data published by Canada Manpower and Immigration) was, in all projections, assumed to apply to that of net migration. This is a faulty assumption and could have significant consequences for the accuracy of the projections, especially in the longer-term. Since this assumption can only, by definition and practice, treat each age/sex component of net migration as a positive inflow, it distorts reality for the inflow of immigrants of one age/sex group may be more than cancelled by the outflow of emigrant Albertans in that same age/sex category. Secondly, the age/sex structure of net migrants is fixed. That is, the same proportions of age and sex apply to different levels of total net migration. This, too, is a faulty assumption. Since high levels of net migration are associated with improved economic and other conditions, one would expect greater proportions of working age people and lower proportions of retired people to result. Thirdly, these projections are demographically generated and thus take little cognizance of future economic prospects for Alberta beyond the assumption that future general economic conditions will not drop below the 1974 level. Fort McMurray is an example of a new economic activity becoming the most important factor in regional population growth.

Forecasts based solely on demographic criteria are inherently weak and unreliable over even short time periods. This is especially true of areas with changing economic and urban-industrial conditions such as Alberta.

An important task, then, is to assess the most likely economic prospects for Alberta to arrive at an ECONOMICALLY INDUCED POPULATION FORECAST.

With the broad range of levels of migration presented in the Bureau's projections, some reading of the "best" estimates of economic conditions for Alberta would be helpful in eliminating the more unlikely population projections. In the medium-term, say the next five to ten years, these weaknesses may not result in significant differences since net migration is never, at any one point, over 0.8% of the total population, although the cumulative effects are. Thus, the difference in the 5-19 age group by 1986 between the high and low migration projections is 22,000 people or 1.0% of the lower 1986 population.

The greatest drawback in the Bureau of Statistics' projections is that they do not provide regional forecasts within Alberta. Since the changing spatial distribution of Alberta's population among its ten Regional Planning Areas could have the greatest impact on future allocations of educational resources and facilities, methodologically sound and realistic population projections for each of the ten Regional Planning Areas appear to be a necessity.

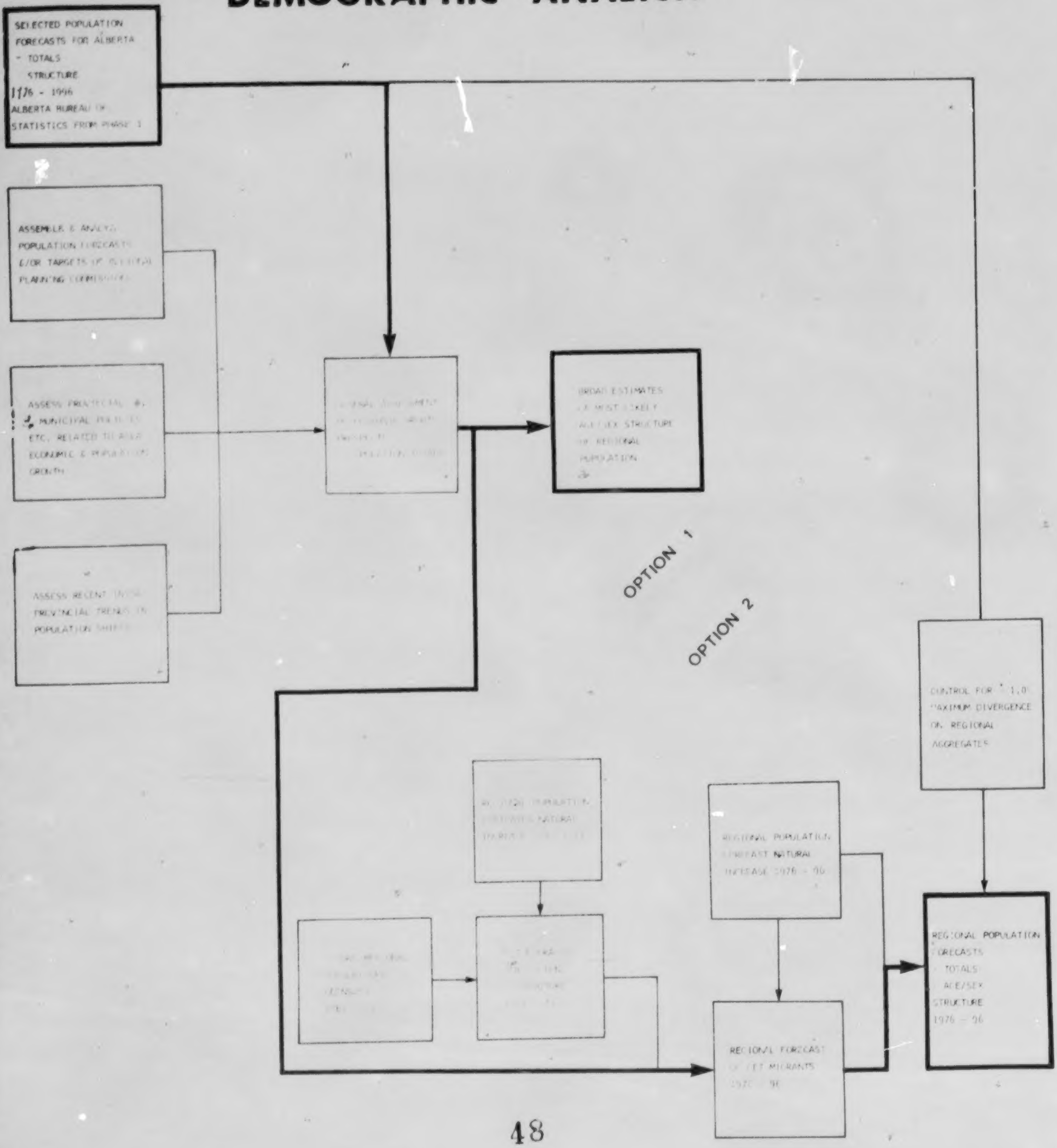
To improve upon the provincial population forecasts and obtain regional projections, the following mechanism is proposed:

PHASE I - PROVINCIAL FORECASTS

In light of the range of migration assumptions used in the Bureau of Statistics' population projections, a good assessment of Alberta's economic prospects is required in order to eliminate the more unlikely population projections. This would involve the exploration of relationships between changes in economic activity and immigration to the province and the application of these relationships, perhaps on a more subjective rather than an objective basis, to prospective economic activity in the future in order to determine the likely levels of migration in the future. On the basis of these migration levels, the more likely Bureau projections can be identified.

EXHIBIT A

ALBERTA EDUCATION DEMOGRAPHIC ANALYSIS


SELECTED POPULATION FORECASTS FOR ALBERTA
- TOTALS
STRUCTURE
1976 - 1996
ALBERTA BUREAU OF STATISTICS FROM PHASE 1
ASSEMBLE & ANALYZE POPULATION FORECASTS &/OR TARGETS OF REGIONAL PLANNING COMMISSIONS
ASSESS PROVINCIAL & MUNICIPAL POLICIES ETC. RELATED TO AREA ECONOMIC & POPULATION GROWTH
ASSESS RECENT INTRA-PROVINCIAL TRENDS IN POPULATION SHIFTS
BROAD ESTIMATES OF MOST LIKELY AGE/SEX STRUCTURE OF REGIONAL POPULATION
OPTION 1
OPTION 2
CONTROL FOR ± 1.0% MAXIMUM DIVERGENCE ON REGIONAL AGGREGATES
REGIONAL POPULATION FORECAST NATURAL INCREASE 1976 - 96
REGIONAL FORECAST OF NET MIGRANTS 1976 - 96
REGIONAL POPULATION FORECASTS
- TOTALS
- AGE/SEX STRUCTURE
1976 - 96

PHASE 2: REGIONAL FORECASTS: TWO OPTIONS

PHASE II - REGIONAL FORECASTS

In light of the most likely population forecasts, Phase II of the process involves the disaggregation and dimensioning of this growth in a regional context, the regions being the ten Regional Planning Areas. The two options in this phase are shown in Exhibit A opposite.

Option 1 involves the general assessment of regional growth prospects to arrive at most likely population totals and finally a broad estimate of the most likely age/sex structure of regional populations. This broad estimate will be more or less intuitive (best educated guess) and original.

Option 2 involves much more detailed and analytically satisfactory regional population forecasts and forecasting process. Using the most likely regional population totals plus the age/sex structure of net migrants, determined by comparing estimated natural increase to actual census population by region, forecasts of future net migrants can be determined. Forecasts of future net migrants are computed by growing the 1971 actual regional populations through natural increase alone and comparing them with the revised estimates of regional targets or forecasts of total population. These regional net migrant forecasts (by age and sex) are then aggregated with the region populations, derived by natural increase alone, to give detailed (age/sex structure) population forecasts for each of the regions. The aggregates of these regional population forecasts will not be allowed to diverge more than ±1.0% from the population forecast for the province.

The Population Forecasting Model suggested for Phase II, Option 2 employs the cohort-survival method, taking into account the age/sex structure of a population and the effects that different age-specific survival and fertility rates and the volumes of age/sex distribution of net migrants will have upon future populations.

Since projections are made by 5-year periods and the cohorts in this approach are five year age-groups beginning with 0-4 and going up to 80-84 and 85+, some apportionment will be necessary to break out numbers in the 5-11 and 12-14 school age groups from the model's 5-9 and 10-14 age groups. Also, if some annual forecasts for the 1976-1986 period, rather than quinquennial forecasts, are required, some apportionment must be made.

It is noted that the Government of Alberta has recently set up an organizational structure for the development of demographic policy under the direction of the Cabinet Committee on Social Planning under the Chairmanship of the Hon. L.D. Hyndman, with Dr. A.E. Hobol, Minister responsible for Demography. The terms of reference are as follows:

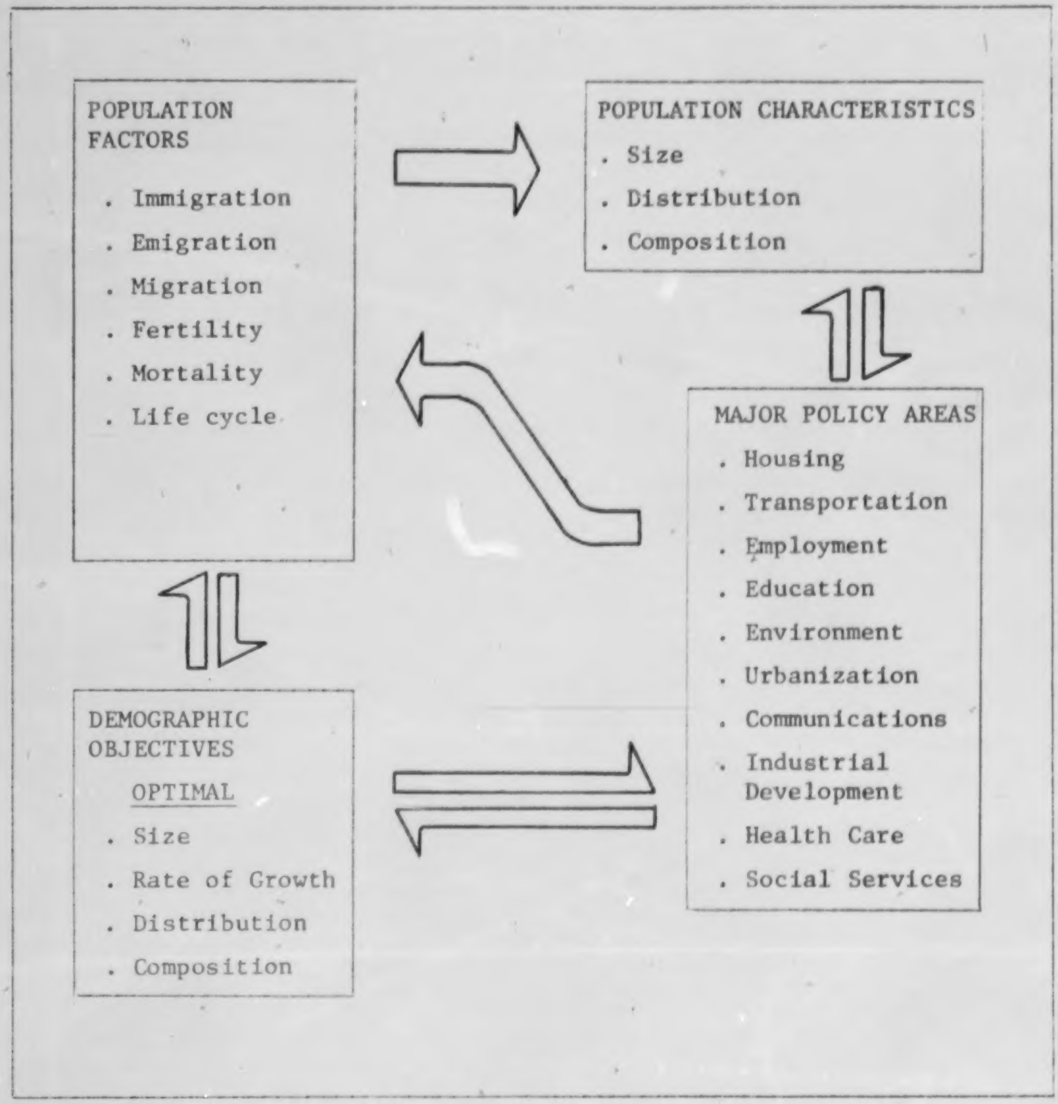
> The intent of a demographic policy is to establish objectives regarding population size, rate of growth, distribution and composition. These population characteristics have a considerable effect on many activities of government concern including, among others, education, health and social services, housing, transportation, industrial development and the environment. Population objectives should be based on knowledge of the economic, social and environmental implications of present population trends, an evaluation of their desirability and the identification of preferred futures.
>
> Not only does population affect other policy areas, it is also affected by them. Industrial development, transportation and housing policies, for instance, can influence population trends. Unless there is some awareness of these inter-relationships, these policies could contribute to undesirable population changes. A demographic policy could provide a framework for assessing the cross impacts in so far as those policies affect or are affected by population.

EXHIBIT B

PERSPECTIVE ON DEMOGRAPHIC POLICY*

An illustration of the functional inter-relationships existing between:

1) population factors - dynamic growth factors
2) population characteristics reflecting population factors
3) major socio-economic and environmental policy areas
4) demographic objectives - identified population policy


POPULATION FACTORS
. Immigration
. Emigration
. Migration
. Fertility
. Mortality
. Life cycle
POPULATION CHARACTERISTICS
. Size
. Distribution
. Composition
MAJOR POLICY AREAS
. Housing
. Transportation
. Employment
. Education
. Environment
. Urbanization
. Communications
. Industrial Development
. Health Care
. Social Services
DEMOGRAPHIC OBJECTIVES
OPTIMAL
. Size
. Rate of Growth
. Distribution
. Composition

* Adapted from "A Framework for National Demographic Policy" prepared for the Demographic Policy Secretariat, Department of Manpower and Immigration, January 23, 1976.

These relationships are shown opposite in Exhibit B entitled Perspective on Demographic Policy.

We strongly recommend that the committee add "economic futures" to the process and disaggregate the study to the level of the ten Regional Planning Authorities of Alberta.

C. PUPIL PROJECTIONS

Recent evidence indicates that the fertility rate in Alberta is declining at a rate closer to the Alberta Bureau of Statistics' lower projections.* For example, the total fertility rate for Alberta for 1973 and 1974 was 2,153 and 2,110, respectively. This compares with 2,154 and 2,128 for those years for the Bureau's low projection as opposed to 2,211 and 2,211 for the Bureau's medium projection which was used in its published population projections. This declining fertility rate will cause Alberta's population to grow at a slower rate for the next ten years (between 1.6% and 2.0% per annum compared to a 1966-1971 annual growth rate of 2.2%). This is notwithstanding possible higher numbers of net in-migrants (15,450 net migrants per annum maximum between 1976 and 1986 compared to a 11,950 average per annum between 1966 and 1971). In addition, the decline in fertility rates will cause, by 1976 and 1981, an absolute decline in the younger school-age group, ages 5 and 6. The numbers in this group should drop from a high of 67,470 in 1971 to lows of around 62,000 by 1976 and 1981. However, towards 1986, the numbers of children between five and six will begin to rise as larger numbers of women enter the child bearing years. The cumulative effects of a declining fertility rate, mortality and aging for each of three net migrant levels upon the school-age population are shown graphically in Exhibit C following, as well as in Table 1.

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* See Alberta Bureau of Statistics, Population Projections: Alberta 1972-1985, p. 71.

EXHIBIT C

ALBERTA'S SCHOOL AGE POPULATIONS
1971 - 1986

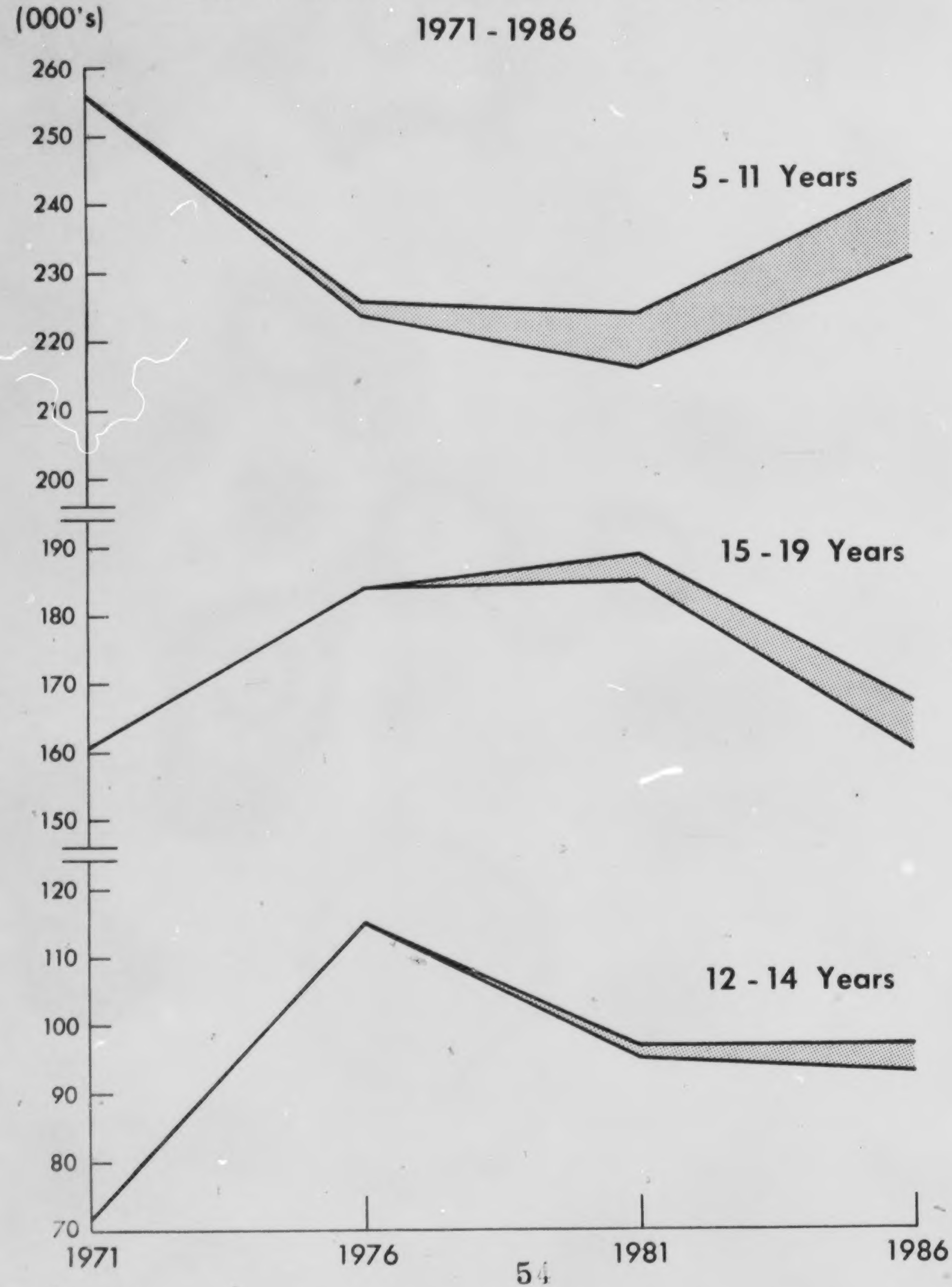


TABLE 1

PROJECTIONS OF SCHOOL AGE POPULATION ALBERTA 1971-1986*

Age Group		1971	1976	1981	1986
			(Thousands)		
5 to 11	High	256	226	224	243
	Medium	256	225	219	236
	Low	256	224	216	232
12 to 14	High	72	115	97	97
	Medium	72	115	96	94
	Low	72	115	95	93
15 to 19	High	161	184	189	167
	Medium	161	184	186	163
	Low	161	184	185	160
Total of Groups	High	489	525	510	507
	Medium	489	524	501	493
	Low	489	523	496	485
Total Population	High	1,627.8	1,790	1,971	2,163
	Medium	1,627.8	1,776	1,926	2,113
	Low	1,627.8	1,765	1,915	2,072

---

* All three projections have the same low fertility assumption. High, medium and low refer to the different levels of net migration: high with 12,500 to 16,900 net migrants per annum, medium with 10,100 to 13,600 and low with 8,100 to 11,000. For further details see Alberta Bureau of Statistics, Population Projections: Alberta 1972-1985, pages 73-78. The figures are from the unpublished projections done by the Alberta Bureau of Statistics.

To give a rough indication of elementary and secondary school enrolment through to 1986, the 1970-1971 proportions of school enrolment to school age population shown in Table 2 following were applied to projected school-age populations.

EXHIBIT D

PROJECTED ELEMENTARY & SECONDARY SCHOOL ENROLMENTS

ALBERTA 1971 - 1986

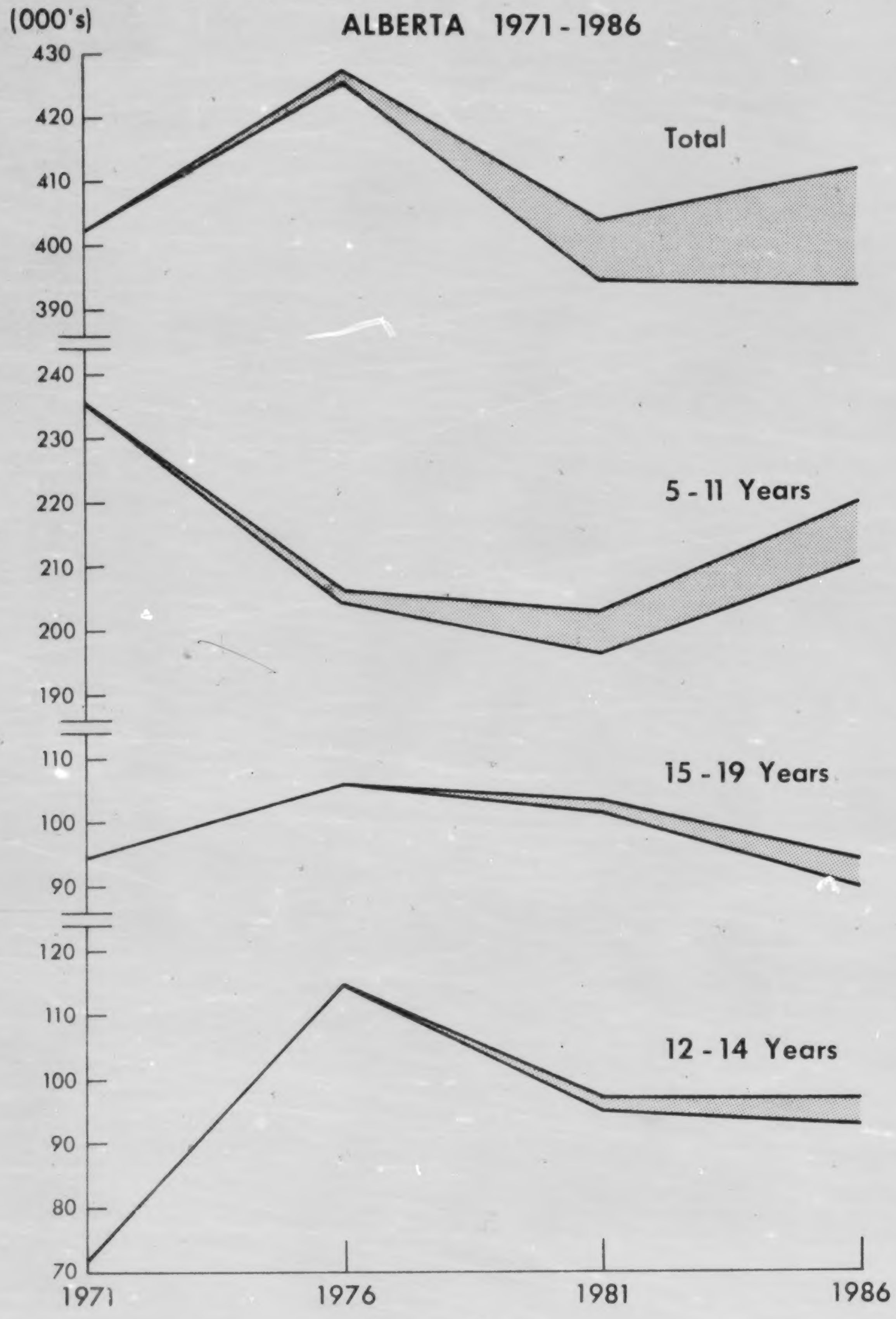


TABLE 2

SECONDARY AND ELEMENTARY ENROLMENT AS A PERCENT OF SCHOOL AGE POPULATION
ALBERTA 1970-1971

Age	% of Age Group Enrolled
5 years	36.7
6-14 years	100.0
15 years	98.6
16 years	91.4
17 years	65.4
18 years	21.4
19 years	6.0

Source: Statistics Canada, Education in Canada 1973, page 324.

The application of these proportions to the previous school-age population projections gives the following results (Table 3), which are also shown graphically in Exhibit D opposite.

TABLE 3

PROJECTED ELEMENTARY AND SECONDARY ENROLMENT - ALBERTA 1971-1986

Age Group		1971	1976	1981	1986
			(Thousands)		
5-11	High	236	206.4	203.1	220.2
	Medium	236	205.4	199.4	219.8
	Low	236	204.4	196.4	210.5
12-14	High	72	115	97	97
	Medium	72	115	96	94
	Low	72	115	95	93
15-19	High	95	106.2	103.7	94.3
	Medium	95	106.2	101.9	92.4
	Low	95	106.2	101.9	89.9
Total Enrolment	High	403	427.6	403.8	411.5
	Medium	403	426.6	397.3	406.2
	Low	403	425.5	394.3	393.4

TABLE 4

PROVINCE OF ALBERTA - DEPARTMENT OF EDUCATION

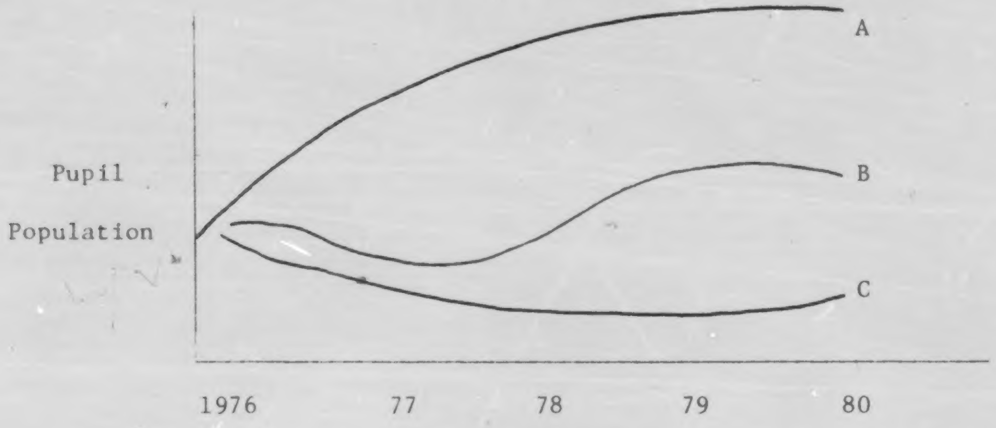
Actual and Projected by Grades of Pupils Enrolled in Public and Separate Schools
(Excluding Lloydminster Districts)

Births	Enrolments	Grade I	Grade II	Grade III	Grade IV	Grade V	Grade VI	Grade VII	Grade VIII	Grade IX	Grade X	Grade XI	Grade XII	Total
	1946-47	18,658	16,153	15,972	15,779	14,948	14,711	14,142	12,481	11,299	8,359	6,702	6,313	155,517
	47-48	19,338	16,600	16,182	16,103	15,319	14,631	14,234	12,365	10,768	8,207	6,580	6,302	156,629
	48-49	20,504	17,448	17,118	16,370	15,792	15,019	14,218	12,693	11,062	7,902	6,566	6,179	160,821
	49-50	22,253	18,546	17,867	16,961	16,170	15,477	14,854	12,884	11,653	8,383	6,484	6,258	167,790
	50-51	21,900	20,085	18,730	17,668	16,884	15,770	15,245	13,786	11,713	9,084	6,865	6,239	173,969
	51-52	22,416	20,096	20,180	18,678	17,601	16,684	15,567	13,958	12,288	9,009	7,056	6,158	179,691
	52-53	25,353	20,494	20,383	20,154	18,551	17,505	16,448	14,482	12,648	9,637	7,199	6,217	189,081
	53-54	27,939	23,464	20,678	20,326	20,037	18,555	17,408	15,461	13,386	9,919	7,902	6,345	201,420
	54-55	26,413	26,649	23,310	20,469	20,219	19,974	18,482	16,441	14,549	10,843	8,472	6,884	212,705
	55-56	27,188	25,906	26,428	23,065	20,372	20,103	19,810	17,412	15,593	11,724	9,028	7,320	223,949
	56-57	27,397	26,222	26,050	26,212	22,958	20,272	20,021	18,735	16,472	12,670	9,665	7,723	234,397
	57-58	28,955	26,679	26,291	25,859	26,026	22,799	20,309	19,213	18,114	13,738	10,780	8,456	247,219
	58-59	30,716	28,112	26,895	26,061	26,056	25,631	22,944	19,569	18,586	15,227	12,033	9,724	261,554
	59-60	32,536	30,105	28,378	27,042	26,211	25,903	26,020	22,222	19,161	15,707	13,344	11,291	277,920
	60-61	34,520	31,765	30,346	28,166	27,070	26,019	26,409	25,042	21,757	16,097	14,021	13,223	294,435
	61-62	35,555	33,765	31,160	29,864	27,960	26,355	26,371	25,310	24,492	18,204	14,506	14,160	307,702
	62-63	35,257	34,908	33,048	31,407	29,980	27,775	27,123	25,537	25,104	20,799	16,597	14,692	322,227
	63-64	36,554	34,504	34,221	32,918	31,319	29,612	28,485	26,219	25,319	21,490	19,314	16,697	336,652
	64-65	37,241	35,964	33,553	34,188	32,745	30,931	30,185	27,576	26,034	22,116	20,201	20,172	350,906
	65-66	38,160	36,507	34,708	33,650	33,779	32,270	31,497	29,118	27,618	22,696	20,374	21,781	362,158
	66-67	38,441	37,395	35,694	35,046	33,277	33,205	33,056	30,019	29,181	24,646	20,963	21,970	372,893
61 38,914	67-68	38,550	38,277	36,715	36,084	34,408	33,403	34,239	32,336	29,491	27,172	22,813	22,484	385,972
62 38,804	68-69	39,178	38,344	38,064	37,041	35,666	34,240	34,397	33,767	31,163	28,559	25,941	25,227	401,587
63 38,467	69-70	39,919	38,555	38,327	37,246	36,688	35,401	35,544	34,121	32,732	31,110	26,868	27,208	413,719
64 36,169	70-71	39,128	38,235	37,682	37,445	37,221	38,704	36,130	34,582	34,825	32,521	28,708	28,793	423,964
65 32,664	71-72	35,529	38,192	38,831	37,364	37,310	37,124	38,139	36,433	34,053	32,462	30,022	30,009	425,468
66 30,592	72-73	33,503	33,978	37,357	38,319	37,828	37,793	38,673	37,610	34,877	33,394	29,402	29,599	422,333
67 30,691	73-74	33,525	32,240	33,763	37,315	38,228	37,758	38,802	38,116	35,967	34,107	30,254	29,675	419,750
68 30,149	74-75	33,217	32,393	32,223	34,151	37,644	38,254	38,606	37,854	36,690	35,873	31,075	29,774	417,754
69 30,855	75-76	34,044	32,324	32,944	33,213	34,837	38,188	39,487	38,632	37,402	36,712	32,651	31,351	421,785
70 31,967	76-77E	35,572	33,836	33,000	33,727	34,032	35,692	39,862	39,585	38,076	36,090	33,080	34,044	426,596
71 30,545	77-78E	34,290	35,238	34,584	33,955	34,826	35,175	36,257	38,896	38,135	37,902	33,217	34,889	427,414
72 28,887	78-79E	33,339	33,090	35,086	34,664	34,153	35,062	35,911	35,555	37,708	37,683	34,583	35,060	421,894
73 29,416	79-80E	33,866	32,172	32,947	35,167	34,866	34,385	35,795	35,216	34,469	37,212	34,383	36,513	416,991
74 29,645	80-81E	34,094	32,681	32,033	33,023	35,372	35,102	35,104	35,102	34,140	34,016	33,953	36,285	410,905
75 32,283	81-82E	36,722	32,901	32,540	32,107	33,216	35,612	35,836	34,425	34,030	33,691	31,037	35,944	408,061

"E" means projected figures assuming continuance of enrolment trend into the year 1977-78 only

Finance, Statistics & Legislation

In addition to having data showing province-wide student population by grades, (Table 4 opposite), it would also be useful to have province-wide forecasts disaggregated down to the ten Regional Planning Areas in Alberta. The local School Boards could then use the regional data as a base for local pupil population forecasts. Even the shape and slope of the curve, plotting local pupil population, is useful in school facility planning as shown below.



Curve	Pupil Population	School Facility Choice
A	Steady Growth	Permanent New Construction
B	Increasing - Decreasing	Relocatable Units
C	Declining	Sharing of Existing Buildings

Alberta is not alone, but shares concern for the problem of declining and especially shifting pupil population with other jurisdictions. In Ontario, for instance, capital expenditure on elementary and secondary schools remained at $95 million in the period 1973-1975 despite the recent trend to declining enrolments.

A comparison of the capital expenditures on elementary and secondary school pupils in Alberta and Ontario from 1970 to 1975 is shown in Table 5.

TABLE 5

CAPITAL EXPENDITURES AND ENROLMENT IN PUBLIC ELEMENTARY AND SECONDARY SCHOOLS IN ALBERTA AND ONTARIO
1970 to 1975

Year	Ontario School Capital Costs (in millions constant $)	Ontario School Age Population* (registered in fall of stated year)	Approximate Ontario per Pupil Cost ($)	Alberta School Capital Costs (in millions constant $)	Alberta School Age Population* (registered in fall of stated year)	Approximate Alberta per Pupil Cost ($)
1970	$200	2,022,401	98.89	$27	425,987	63.38
1971	159	2,031,360	78.27	29.5	427,968	68.93
1972	126	2,028,114	62.12	21	425,251	49.38
1973	95	2,008,610	47.30	13	419,737	30.97
1974	95	1,994,489	47,63	15	432,177	34.71
1975	95	1,994,638**	47.63	17.9	439,725***	40.71

* from Statistics Canada, cat. 81-210, Elementary-Secondary School Enrolment.
** from the Ontario Ministry of Education.
*** from the Alberta Ministry of Education.

The anomaly of stable or rising educational expense in spite of fewer students, is also well illustrated in Metro Toronto. In 1975, enrolment dropped 8,000 students but the general education bill rose by $35 million to $503.7 million to educate 381,000 elementary and secondary school pupils.

The neighbourhood school concept is gaining renewed strength in the eyes of the public over the large central school concept and the bussing implications. Federal and Provincial housing plans can therefore put pressure on new school construction in new developments even in the event of overall declining enrolments.

SECTION III

SHARING, ACQUIRING AND DISPOSING OF FACILITIES

A. SHARING FACILITIES WITH OTHER ORGANIZATIONS

This section identifies the advantages and disadvantages of the various alternatives available to provide the facilities necessary to the delivery of educational programs but there is no simple solution to the problem of selecting the best alternative in each case. What is necessary is to establish an adequate planning process that includes long range planning, sound information upon which to make the decision, guidelines for the evaluation of all possible alternatives in each case, and qualified professional persons to participate in the planning process. Some guidelines as to the elements to be included are therefore suggested in later subsections.

1. SHARING FACILITIES WITH PUBLIC ORGANIZATIONS

The "Community School" is the most obvious example of the provision and use of shared facilities. The Educational Facilities Laboratory Inc. established by the Ford Foundation defines community school as: "a place planned and operated cooperatively by schools and other agencies for the delivery of social services, including education, to the entire community".

The pressures for schools to expand services and to become less insular are both economic and social.

Economically, it is questionable whether the public can afford to operate buildings for less than one-third (7-8 hours) of the day for half (180 days) of the year, while serving about one-fifth of the population. This low utilization is even more pronounced in small isolated communities where school facilities with their attendant libraries, laboratories and multi-purpose rooms serve a relatively small number of pupils. Some schools are seeking partners to share the burden of distributing education and other social services to their communities.

Changing social attitudes, as much as financial cutbacks, are helping to create a climate favourable to community schools. The realization that learning takes place in many activities outside the classroom is giving new meaning to community education. So is the growing awareness that learning is dependent upon the quality of the learner's home life, health, recreation, social activity and environment. Acceptance of the concept of education as lifetime learning to be pursued by the adult and the handicapped as well as the young and the gifted is also contributing to the rationale for community education. If the diversified needs of community residents are going to be met with integrated programs capable of administering to a single individual's many interrelated problems, schools will have to share responsibilities with other agencies in the community.

This idea of cooperation between school and community is not new, but its implementation, beyond the occasional leasing of school buildings for civic activities, has been rare. Yet cooperation between the school and other institutions is generally acknowledged to have the potential to:

- save money or make it go further,
- avoid duplication of effort,
- make better use of resources (staff, finances and facilities),
- aggregate diverse expertise and experience for the benefit of a large constituency,

- offer many options to facility and students,
- provide contacts between persons of different ages and backgrounds,
- coordinate educational and recreational activities with health and social welfare agencies to help citizens identify and use the services available in the community, and
- serve new kinds of people and thereby broaden the public support for education.

The majority of community schools in the U.S. have grown gradually and are still developing, moving from simple sharing of space or staff into other areas of collaboration, including joint financing, management and programming. The buildings they occupy - unrenovated schools, modernized structures, leased space - are as diverse as the schools' methods of operation. Consequently, the terms "Community School" and "Community Education" mean different things to different people.

A community school was conceived as early as the 1930's in Flint, Michigan in response to the city's need for playgrounds and summer programs. Later, three separate community facilities merged into an integrated school/community centre. The original programs in community recreation and adult education extend the school's use from eight hours to eighteen hours per day. During many years of community education there have been significant improvements in preventive health. There is less juvenile delinquency and absenteeism has dropped. Enrolment in adult education has increased at double the national rate.

In 1962, New Haven, Connecticut established a new form of community school comprising a community park that includes classrooms, shared recreational space and buildings designed specifically for community use.

A few schools jointly planned and established by representatives of school and community are housed in new buildings designed explicitly to accommodate integrated programs. These schools are noteworthy because, in addition to school and community facilities, much of their space is held in common by school and community organizations who share its use. Three examples are:

- John F. Kennedy School and Community Centre, Atlanta, Georgia
- Thomas Jefferson Junior High School and Community Centre, Arlington, Virginia
- Whitmer Human Resources Centre, Pontiac, Michigan.

Each of these schools provides school and community services to its neighbourhoods. Each is run as a partnership, with unified control and operation, and each occupies a facility that was designed and built to the joint specification of the tenants. Special characteristics of these schools are as follows:

- Both school and community representatives planned the building and both continue to take part in the administration.
- A joint financing mechanism, instead of separate budgets of the participants provides a greater amount of capital financing plus more stable support for future activities.
- Joint operation of the centres is based on a business-like agreement between the parties involved.
- A centralized administration acts as a liaison and mediator between agencies and users, and assists in integrating programs.

The primary mission of these three schools to educate has not changed; but there are more options for learning and better use of resources making it possible to reach persons not previously interested in education. All programs can be funded on a long-range instead of a one-time basis. Productivity has increased through greater use of the physical plant, more efficient programming and innovative approaches to total learning.

The John F. Kennedy Centre houses classrooms, library, swimming pool, gymnasium, theatre, social service and a sheltered workshop all under one roof. More than 45% of the space is devoted to agency offices, recreational services, day care, vocational training and a variety of rehabilitative workshops. Thirteen public agencies, two foundations and the U.S. Department of Housing and Urban Development were involved in its design. The community has free use of most of the facilities at all times of the day (members of the community eat lunch with school children, for example) and full use of the entire centre after 3 p.m.

The Whitmer Human Resources Centre in Pontiac, Michigan was built to replace four ailing elementary schools and also to include office space for ten community agencies. Fifteen areas are shared by school and community programs, including a medical and dental clinic, adult education, day care services, recreation and arts and a public restaurant. Total enrolment is 2,000 pupils. The building, comprising 120,000 sq.ft. of "school" area and 56,000 sq.ft. of "community" area, is located on a 14 acre site, and is open from 7 a.m. to 10 p.m.

The Thomas Jefferson Junior High School and Community Centre is a joint-use building open from 6 a.m. to midnight, seven days a week. From 9 a.m. to 3 p.m. the largest part of the school field house is used by Junior High School students. Concurrently, the recreation department operates programs in special areas set aside for it. After 3 p.m. the emphasis shifts. Regular school cuts back, the recreation program expands, and adult education takes over most of the academic space.

At Thomas Jefferson Junior High School, students mix with adults, including senior citizens, and with pre-school children. All ages eat together. The school day closes with adult and university extension classes moving into spaces vacated by junior high school students. In the evening there may be as many as 6,000 spectators at a basketball game or several hundred at a performance or concert in the theatre.

The Madonna School in Alberta (mentioned later in this report under "core schools") included an area that serves as a chapel for church services on week-ends and an added facility for community use during the week. In addition, the Recreation Department was involved in incorporating into the plan a facility that would be conducive to various activities applicable to community use. A real interest was expressed by the community in having a facility that would serve both the students and the needs of the public; that the facilities, staff and buildings of the school and the public services be integrated to the extent that the school assumes responsibility for nearly all aspects of education as it relates to that community; that the clientele should become the pre-school, the school, the post-school and the adult age groups of the community.

A noteworthy example of shared facilities now exists in Leaf Rapids, Manitoba. Leaf Rapids is a newly completed mining community of 2,500 people, approximately 500 air miles north of Winnipeg. The town was built to house primarily the working force required for the new mining operation at Ruttan Lake, 16 miles away. Contrary to the traditional approach of the resource company as builder and owners of the town, the provincial government has assumed this role and the resource company has become the major contributor to the annual municipal taxes. A Crown Corporation - the Leaf Rapids Development Corporation (LRDC) was established as a management vehicle to organize the planning and construction of the central community complex. Criteria were established emphasizing ecological preservation and social integration of native peoples presently in the region. The complex was designed to be physically integrated into a flexible "uni-building" that offered the following advantages:

- comfortable access to all town functions in inclement weather,
- grouping of all functions together to allow and encourage maximum inter-utilization of facilities such as recreation by adults and school children, school by children and adults, health facilities by school,
- compact building grouping to conserve land coverage allowing greater retention of natural surroundings,
- facilities are housed in a minimal amount of building enclosure to conserve maintenance costs and permit inter-use of mechanical components in the event of breakdown.

A dominant portion of the development of Leaf Rapids is the school facility. It occupies a major position on the interior sheet system opposite the commercial and institutional facilities to encourage its use as an active element of community life by all age groups, day and night. The school resource centre (library) shares service facilities with the adjacent public library and cultural centre. The industrial arts room is located to give convenient access to adults for hobbies such as carpentry. The theatre located across the mall from the school serves uses such as commercial movies, drama, school assemblies, touring symphony and ballet, as well as multi-denominational church services. The gymnasium and arena facilities will be used both as part of the school physical education program and by the community at large.

Because of the complexity of the various governmental department requirements, the architects for the Leaf Rapids project were required to work with the planning and priorities committee of the cabinet who expedited access to all segments of the government and sped up the normal bureaucratic process of approvals. This required integration of the Departments of Youth and Education, Health and Social Services, Health Service Commission, Provincial and Federal Department of Public Works, Post Office, Parks and Recreation, Attorney General's Offices and the Manitoba Development Corporation. A series of real estate consultants were appointed to prepare shopping centre and hotel feasibility studies and establish requirements. The requirements of all these departments were received, tabulated, areas assigned and documented into a final working architectural program on which design studies were prepared.

Most school boards interviewed in both Canada and the United States have initiated programs of sharing facilities with other public organizations. For the most part, departments of parks and recreation have become involved.

Land considerations are paramount. A school board need only buy sufficient land to build the school and provide parking spaces and then use the park space for its recreational areas. In return the Parks and Recreation Department can use the school after school hours for a variety of activities. Athletic events can be held in the school gymnasium, the shops, sewing and home economics rooms can be used for a variety of other courses and the classrooms can be used for instructional community courses and adult education.

The Parks and Recreation Departments also have the staff and budget to utilize the school facilities at no capital cost to themselves and at no operating costs to the school boards.

A further extension of this concept is being used in Toronto in the Brown Community School. The city, through the Parks and Recreation Department, built the gymnasium for the school, while the school provided the land. The school uses the gymnasium during the day, and Parks and Recreation uses all the school facilities after school hours. The Parks and Recreation Department has a full-time director to administer its programs. This exchange process of facilities is done solely on a permit basis.

The Etobicoke and Peel Boards of Education in Ontario also share facilities with Parks and Recreation Departments. In Etobicoke, the attitude is that the community paid for the school and should be allowed full use of the facilities. Etobicoke Parks and Recreation offers a complete range of courses through the schools. It has three full-time directors coordinating the use of school facilities. There are no charges levied against Parks and Recreation for using the school facilities unless expenses are incurred over normal operating costs.

In Manitoba, the Winnipeg Board of Education is also selecting sites for new schools adjacent to city parks to implement these forms of programs.

Another form of sharing facilities has occurred in the Toronto and Peel Boards of Education. In these cases the public school boards are sharing space with the separate school boards. Essentially, the two boards are existing under the one roof of one building while each school within the building will be a complete entity (each has own administrative staff) while making common use of the other non-classroom facilities.

Similarly, the North Red Deer Community Centre in Alberta, when complete, may have connected separate and public junior high schools as well as a variety of other facilities to serve these two schools and community educational and recreational needs generally.

In Newfoundland there is sharing of facilities between levels of schools. The lower level schools will use the vocational facilities that exist within the neighbouring vocational schools instead of building their own facilities.

It is the act of sharing space between the school and the community that gives community schools their special quality. Proponents of the community school claim that the earlier the community becomes involved - and the deeper and broader the involvement - the greater are the benefits to both school and community. These benefits are both economic and social. The principal advantages of community schools are as follows:

(a) Capital and/or operating costs can be shared with benefits to both school and community.

(b) Duplication of effort can be reduced.

(c) Expertise and experience can be concentrated in a single facility, and more options can be made available to facility and students.

(d) Opportunities are available for contacts between persons of different ages and backgrounds.

(e) Educational, recreational, health and social agencies can be coordinated, if desired.

(f) Public support for education can be broadened.

(g) As school enrolment diminishes, community use can increase.

(h) Schools in sparsely populated isolated areas can achieve better utilization of the facilities needed for a full curriculum.

The principal disadvantages of the sharing of facilities are as follows:

(a) The planning process is more intricate and time consuming.

(b) New programs require new sources of operating funds.

(c) More administrative time is required, particularly where programs are coordinated or integrated.

(d) Funding for both capital costs and operating costs is more complicated.

(e) Provincial educational authorities could lose full control of the review and approval process.

(f) Enthusiasm for community involvement might wane at a rate similar to declining enrolment.

Project Library

The project library on school facilities gathered by Woods, Gordon & Co. in connection with this study has been turned over to Alberta Education and contains numerous publications on sharing facilities.

Conclusions

Clearly, there are some very substantial potential advantages in the sharing of facilities between schools and the community. School boards should therefore be encouraged by the provincial government to explore opportunities for sharing facilities, particularly where savings can be realized in capital and/or operating costs, and where better use can be made of facilities needed for a full curriculum.

2. SHARING FACILITIES WITH PRIVATE ORGANIZATIONS

This subsection deals with the concept of sharing facilities with commercial enterprises. The proximity of commercial space to educational facilities can provide the mixture of different occupations that reduces the separation of education, recreation and social improvement through daily activities such as shopping, meeting friends, and making contacts with people of various age groups. In some cases, school-age parents find employment nearby the school, increasing their opportunity for contact with their children during the working day. There is also the possibility of coordinating the development of schools and commercial enterprises to provide the type of flexible facilities that allow the school to encroach on commercial space in times of high enrolment, and give up space to commercial enterprise when the school population declines. This coordinated approach could assist in producing schools at the time they are needed, since the need for schools almost always falls closely behind private developments.

Private enterprise is probably the most difficult kind of partner to include in a shared facility. The deliberate use of public money to construct private space is not generally considered to be an acceptable practice. However, school boards should not necessarily be prohibited from leasing space to commercial enterprises after that space is no longer needed for public use. It is difficult to mingle commercial money with public money without strict cost accounting, although such a practice is not impossible.

One alternative is to convince private developers to include a school in a commercial venture. In Chicago, the developers of a housing project obtained renewal rights to a depressed area of the city in order to build moderate and low income housing. The project was financed by HUD which gave the developers a 20 year mortgage at low interest. In order to secure the same favourable terms for the proposed community school, the developers agreed to sign over the rental profits from the proposed shopping centre (that was part of the development complex) to support the community school. Thus, the school district obtained a "free" community school, well integrated into the architecture of a shopping centre, and a source of revenue that will last as long as tenants of the shopping centre renew their leases and operate profitably.

The Peel County Board of Education in Ontario plans to purchase land and/or air-rights in order to build four new schools designed to be part of the commercial complex of Erin Mills New Town development in the town of Mississauga. Both the schools and the developer see distinct advantages in working together. Both parties claim savings on shared facilities (parking, access roads, common walls, heating systems, etc.); both feel that a single centre would give the developing new town a central focus for its community. Schools will have access to the community facilities, and the developer sees an enhanced value for his commercial space due to increased patronage and activity. At this point in time several other public agencies have agreed to participate. The department of libraries will share in the financing of a joint public/school library. The department of housing has agreed to construct apartments adjacent to the complex, and a group of churches will help to capitalize many school spaces in order to include a private school as part of the package.

Buffalo, N.Y. developed another alternative. The New York State Urban Development Corporation, a state agency created to develop and finance housing to assist in the development of commercial, civic and industrial facilities, jointly sponsored a community complex with the City of Buffalo, its board of education and the Buffalo Urban Renewal Agency. This complex is a "Town Centre" in the middle of a new-town-in-town development and will provide education, recreation, health care, day care, social services and, because land directly adjacent to the publicly sponsored Town Centre was reserved for private development, commercial shopping for the 2,800 new housing units. Thus, a mixture of private and public spaces and activities is assured.

Many other school boards have considered plans to include schools as part of a multi-unit residential complex. The Etobicoke Board of Education has even drafted guidelines for handling this type of situation. Essentially, the Etobicoke Board feels that in the older areas of higher density, a school could be built and the air space above the school leased to a developer on a long-term lease. The developer could then build an apartment complex above the school (providing for separate entryways). The apartment complex would have to be designed not to interfere with the activities of the school. The apartment dwellers then would be able to utilize some of the school facilities including the field area after regular school hours. The Etobicoke Board would hope that if an agreement of this nature is negotiated in the future that the revenue received from the lease would cover the cost of the land and the school.

Manitoba and Prince Edward Island School Boards have also had several developers propose that schools be part of a development that they were considering. Manitoba has declined to pursue these proposals because they do not want to include school facilities in an environment they cannot completely control.

Clearly, the legal obstacles and funding complexities impeding the mixture of private and public spaces are not insurmountable. Most of these restraints are due to existing laws, regulations and restrictions. With ingenuity and persistence, these impediments could be removed to permit innovative partnerships between public enterprise and private energy.

Summary

Partnerships between school boards and private enterprise have forms varying from the board's owning projects (with the developer leasing air-rights) to the developer's owning property and buildings (and leasing space to the board). The approaches to providing the facility are as diverse as the ownership and leasing arrangements. Whatever the arrangements and approaches, the principal advantages of the partnerships are as follows:

(a) Capital cost (or leasing) arrangements can offer significant savings to both school boards and developers.

(b) Arrangements and facilities can incorporate the kind of flexibility that will permit the school to encroach on commercial space at periods of high enrolment, and commercial enterprise to take over former school accommodation as enrolments decline or cease to exist.

(c) Opportunities are available for contacts between persons of different ages, and working parents can sometimes maintain contact with children during working hours.

(d) Educational, recreational and social agencies can be coordinated if desired.

(e) Coordinated efforts can make best use of expensive, serviced land.

(f) Public support for education can be broadened through increased visibility and utilization of school facilities.

(g) Schools can form part of a group of facilities that provide a focal point in the community.

(h) The provision of school facilities can be coordinated with other development, so that the schools are available at the time they are needed.

The principal disadvantages of the partnership between schools and commercial developments are as follows:

(a) The planning process is more intricate and time consuming.

(b) Financial arrangements are more complicated, and subject to more public scepticism

(c) Special methods are required for Provincial review and approval* for specific cases.

(d) Although the school board and the developer share some common interests, other interests are not shared between them and there might be areas of conflict and disagreement during the course of the partnership.

(e) The choice of the approach to providing facilities might be removed from the hands of the school board. The developer would clearly favour a maximum involvement in design and construction if he has equity in land and or buildings.

Conclusions

School boards should be encouraged to maintain contacts with those who own land and/or are commencing a development within the school board's territory. Boards should be receptive to developers' proposals that could produce the required facilities at the time they are needed, reduce capital and operating expenditures, increase flexibility, provide facilities responsive to changes in enrolment, and add a measure of community involvement. Needless to say, a careful assessment is required by the government of all proposals so that comprehensive comparisons can be made with other methods of providing facilities.

B. METHODS OF ACQUIRING FACILITIES

Regardless of the extent of community involvement, community schools can be accommodated in permanent new facilities, core schools, transportables, relocatables, disposables, renovated buildings leased facilities or any combination of the above. The following paragraphs deal with each of these methods, listing their advantages and disadvantages, and suggesting the kinds of situations where one method might be selected in preference to others.

1. CONSTRUCTION OF NEW FACILITIES

(a) Constructing a New, Permanent Building

With few exceptions, almost all of the school facilities presently in existence are the result of the construction of new permanent facilities some time in the past. In many cases additions or renovations have been made to these permanent facilities in intervening years.

A number of approaches have been used for the design and construction of new permanent facilities. A description of these approaches and their advantages and disadvantages is set out below:

- Traditional (Tender and Contract) Approach
- Construction Management
- Project Management
- Bid Design Approach
- Systems Approach

(i) Traditional (Tender and Contract) Approach

The process that produced the bulk of the present inventory of school buildings evolved in a natural way. Firstly, there was an urgent need for facilities to catch up with the demand that was left unmet during the Depression and World War II. Secondly, there was a general belief that the schools built to meet the demand could be expanded in increments as required to absorb population increases and populations would continue to rise indefinitely. Third, the current requirements for space were simply defined - a certain number of rooms at a designated number of square feet per room. Fourth, construction techniques took advantage of the General Contractor who carried out the work of the general trades and sub-contracted the work of the specialized trades, all of whom had a clear understanding of individual responsibilities as well as an appreciation of the way that all of the parts of the building fit together. Fifth, cost escalations were reasonable and predictable. In this environment it was natural that the Architect would receive the Board's instructions on space needs (including expansion capability), translate these needs into a building design and prepare contract documents for competitive tendering by general contractors. The successful General Contractor would then construct the building under the supervision of the Architect.

The advantages of this system are as follows:

(a) Each building can be tailor-made to its own requirements.

(b) The process of planning each school can be broken up into a series of steps. Documents can be submitted for examination to Provincial Authorities at the completion of each step.

(c) The Architect's contract documents permit lively competition between general contractors and between sub-contractors on clearly defined specifications.

(d) The quality of construction is determined and controlled by the architect who does not benefit financially through the lessening of the quantity or quality of materials. The architect's specifications influence the life span of all elements of the building.

(e) A knowledgeable architect should be able to design a building within a reasonable capital cost budget. He can advise on the economics of savings in operating costs resulting from increases in capital costs.

The disadvantages to the Traditional Approach to the construction of new facilities are as follows:

(a) Historically, the approach has not produced major innovations. The probable reasons for this are that projects are too small, budgets are limited and time is too short. There is also the question of whether or not the risks to the architect are worth the potential benefit. In addition, major innovations tend to restrict full competition, particularly amongst small contractors who deal in shelf items and standard techniques.

(b) Although buildings can respond to incremental increases in enrolment, they do not respond to decreases in enrolment. Nor do they respond to cyclical changes in enrolment. The combination of a new "core school" with the installation and removal of transportable units in response to changing enrolment is one method of overcoming this disadvantage.

(c) Historically, new buildings designed and built under the Traditional Approach have not responded well to new educational methods such as the "open" school or the "free" school where flexible column-free space is desirable. However, there are recent examples of open flexible plans that have been produced using the Traditional Approach.

(d) The architect is fully responsible for the design and construction details of all elements of the building, seeking advice from whomever he wishes during the development of the contract documents. The system does not permit the full involvement of contractors, sub-contractors, and others experienced in construction methods and techniques.

(e) The Traditional Approach relies heavily on the current methods, techniques and organizational relationships of general contractors and sub-contractors. Architect's specifications are organized on a trade basis with the result that each trade installs its own work as independently as possible of the work of other trades. Factory produced systems and installations that span over a number of trades are generally used only when they have become standard components developed elsewhere.

(f) The Traditional Approach to providing new facilities is a step by step approach, and thus requires more time than an approach that allows a number of activities to take place at one time.

(g) The professional architectural fee is usually a percentage of building cost, which does not encourage lower building cost.

In spite of the disadvantages that are inherent in the Traditional Approach, it remains the most common method for the provision of new school facilities. For example, officials in Ontario state that over 95% of schools in the province are still designed and built in this fashion, and it is the basis for the planning process in most jurisdictions. Planning officials express a preference for the Traditional Approach. Clearly, the advantages of tailor-made facilities, cost control, quality control, and the availability of independent professional advice are compelling reasons for maintaining this approach.

The approach has survived by being flexible enough to respond, albeit sluggishly, to innovation in teaching methods and construction techniques.

On the basis of interviews with school boards and educational officials across the country, it is apparent that school boards generally feel that the advantages of this system outweigh the disadvantages. The expression of the advantages and disadvantages also seemed to be consistent across the country. It was apparent, however, that the other alternative methods of providing facilities are being considered more frequently and seriously by those interviewed and although no percentages could be estimated, it is expected that the number of schools built in the traditional way will decline.

Another aspect was the extent of using specifications. The majority of school boards have detailed specifications describing schools at each level's requirements which are then tailored to the requirements of each school. One school board near Toronto does not have specifications, but plans and describes each school from the beginning. It has found by doing this it gets better utilization of space by challenging each concept (i.e. space alloted to offices, stage, etc.) at the building of each school.

(ii) Construction Management

The approach known as Construction Management came into being for two principal reasons. First, it permitted the active participation of the general contractor as an Owner's agent in the design and construction process. Secondly, it was a method of saving time.

Although there are many variations in the Construction Management approach, the usual process involves the same early activities as the Traditional Approach. The School Board prepares the necessary documentation with respect to space needs. These needs are given to the architect to translate into a functional building design. Before the architect's drawings are developed into working drawings and specifications, a Construction Manager is selected through negotiation or competition, and retained by the Owner on a fee basis. The initial responsibilities of the Construction Manager are: (1) to make available his expertise and offer advice to the architect on construction methods and techniques, and (2) to assist in the preparation of capital cost budgets for the project. Then, as working drawings and specifications are prepared, the project work is divided into a number of packages (excavating, foundation, building structure, and so on). Once the contract documents on a package are completed, the Construction Manager assists in calling tenders and negotiating contracts for the specific work involved in each package. This permits construction to commence on the early packages while documents are being prepared on later packages, thus saving a considerable amount of time, particularly on large projects. This time saving procedure is sometimes called "fast-tracking".

During construction, the Construction Manager takes on the scheduling and coordinating responsibilities normally assumed by the General Contractor. In most cases he has no contractual responsibilities for specific trades. Instead all trades including excavation, concrete, carpentry and masonry are handled by "package" contractors who sign contracts directly with the Owner.

The principal advantages of this system are as follows:

(a) The expertise of the Construction Manager is available before final decisions are made on the use of materials, construction methods and techniques.

(b) Under the Traditional Approach, the Contractor's prime motive is to make as much money as possible within the terms of the contract and without jeopardizing the project. The Construction Manager on the other hand, has no such conflict of interest and is free to offer his expertise to the Owner and Architect on a professional basis.

(c) The Construction Manager may have more freedom to select subtrades than the general contractor.

(d) Time can be saved on large projects.

The principal disadvantages of the Construction Management Approach are as follows:

(a) There is no competition at the General Contractor level. This is offset to some extent by competition at the subtrade level.

(b) Construction Management does not follow the same step by step process that is inherent in the Traditional Approach. Thus, review and approval bodies do not have the full opportunity to make changes or terminate work at many stages of the planning process. Once excavation commences, the building must be completed even though contract documents have not been prepared for many of the costly trades (e.g. mechanical and electrical).

(c) Cost control is only as good as the estimating ability of the Construction Manager. The final price is not known until the last contract is let.

(d) More time is required by school boards and approval bodies in monitoring and controlling the design and construction process.

Construction Management is effective on large projects where time is important. Sometimes economies can be achieved by letting contracts early to avoid cost escalation. However, there seems to be a growing feeling that the time savings, and the value of the Construction Manager as a member of the construction team seldom outweigh the loss of control by school boards and fund granting bodies.

Mr. Lawson (Chief Architect of the Ontario Ministry of Education, Division of Schools) made the following statements concerning Construction Management in March 1976:

> Where there is a sense of urgency - the children are there and there is no school - it might be worth considering. However, it has not worked too successfully as a method of cost control - so at the moment we are taking a rather hard look at any board's project where it is suggesting Construction Management, and, if we aren't

> completely justified by (1) their need for getting the school up fast, and (2) a very sophisticated Construction Management program, we are usually refusing permission.

The Construction Management approach is however used by many school boards interviewed in Ontario and in Quebec. The approach seemed to be used in Ontario for individual boards whose building budgets were of sufficient size to justify bringing in outside assistance. For example, within the Toronto Board of Education's Planning Department, there are only sufficient staff members to handle 10% of the construction programs taken on each year. This minimum staff size is supplemented by using professional Construction Managers from outside of the Board of Education. Other school boards will use this approach or have used this approach when their own internal resources could not meet the construction demand, as was the case with the Deer Lake Integrated School Board in Newfoundland. Many other school boards use this approach in their School Construction Programs, although they sometimes refer to it as Project Management (see next section). This is probably a result of misunderstanding the correct terminology as opposed to the system that they employed. For example, the Scarborough Board of Education in Ontario indicated that they use a method of Project Management. However, in a good many cases, the Superintendent of Plant for the Scarborough Board of Education will act as a Project Manager, and he hires the Construction Managers and Architects to work for him.

The Scarborough Board have built 12 schools in this manner in the last 10 years, and have gained a great deal of experience with it. They have found the principal advantage of using the Construction

Management (Project Management) process is the speed at which a school can be built (i.e. fast tracking). For example, a 1,500 student secondary school costing $4 million was built in just under 18 months. Scarborough has also found that another advantage of using the fast track construction approach is that each phase can be designed to maximize the use of the budget. If, by using the fast-tracking approach, it became obvious that the budget would be underspent at one phase of construction, the surplus could be incorporated into other phases to improve the quality of construction or to acquire better equipment. The disadvantages of this method are that highly skilled technical people are needed within the Educational Department to oversee any construction work, and that the degree of success for a project depends too much on the skills of the architect hired.

Lastly, when a number of projects are underway at one time, not all schools can be built this way. It requires too much time on the part of the individuals responsible for administering school construction to oversee each project.

While one of the main reasons for using this approach is to build schools faster at a reduced cost, (this has been accomplished in the case of the Scarborough Board), most school boards do not attempt to build schools at less than the allowable grant amount. Instead, they try to get the maximum benefit from each grant dollar. One of the school boards which had used Construction Management in the past, and would use it only on a very limited basis now, pointed out that, in an upturn market of high rising costs, the ultimate cost of the school could far exceed the budget. It was also pointed out that, if the school board becomes aware of these rising costs at early construction phases, it might attempt to reduce the costs of subsequent phases. In any case, there is a need for an extremely experienced and competent construction manager within the school board's building department to monitor the use of this approach in order to provide worthwhile results.

(iii) Project Management

All projects involve some measure of management and control. In the Traditional Approach and for the most part in the Construction Management Approach, the responsibilities for management and control shift from one group to another during the planning and development process. The Owner or School Board is primarily responsible for the management and control of the project throughout the period when space needs are being developed and documented. These responsibilities shift to the architect and his consulting engineers during the process of building design and the preparation of contract documents, and then become the responsibility of the general contractor or construction manager during construction.

On large complex projects or on projects where the Owner does not have the time or personnel available to play his part in management and control, the services of a Project Manager are sometimes retained. The Project Manager is usually an independent professional who assumes the responsibilities for overall management of the project from inception to occupancy. He develops systems and procedures of cost control, quality control and prepares schedules of activities for all groups engaged in the work. Reporting systems are developed to ensure constant monitoring and control. All activities come under the direction of the project manager who has the overall responsibility for the successful carrying out and completion of the project within limits set out for quality, cost and time.

The project manager's responsibilities do not overlap the specific expertise and responsibilities of the Owner, Architect, Consulting Engineers, General Contractor or Construction Manager. Instead, the project manager acts as a team leader, under whom each specialist performs the function for which he is best equipped.

Construction management frequently forms part of the Project Management Approach because of the ease with which the sequential tendering of construction packages can be incorporated into cost and time control systems developed by the Project Manager.

The advantages of Project Management are as follows:

(a) The cost, time and quality of a project can be controlled from inception to completion.

(b) Each participant on the project can carry out work which he is best equipped to do.

(c) Review and approval procedures and time can be built into the time control network.

(d) The Owner can look to one person for the overall responsibility of the project throughout its duration.

The principal disadvantage of the approach is: that a project manager is probably unnecessary on most school projects, because they lack the size and complexity to warrant a separate sophisticated management and control system.

Our interviews support the above conclusions. As indicated earlier, many schools used the Construction Management Approach while calling it "Program Management". This was true only in the sense that personnel within the school board building department assumed the role of project manager.

We are not aware of any school projects in which a full project management and control system has been used. However, we have intimate knowledge of the $100 million postal facility (MAPP Toronto) where Woods, Gordon & Co. were Project Managers throughout all phases of the project from developing user requirements to occupancy and start-up. This project involved a successful combination of Project Management and Construction Management that permitted an early construction start, and the preparation of contract documents to meet a tight schedule of sequential tendering.

(iv) The Bid-Design Approach

The proponents of this approach claim that buildings can be designed and built more effectively and more economically by contractors than by means of any of the three approaches described above. They believe that knowledgeable builders, given the space needs and performance requirements of the facility can select the most appropriate materials, methods and construction techniques and provide a satisfactory facility with the most effective use of time and money.

In order to use this approach the Owner first prepares a request for proposal document that gives the detailed requirements for space needs, including room sizes, ceiling heights, and the desirable interrelationships between the various functional areas.

The document also states the performance requirements expected of room finishes, exterior walls, roofing, insulation, windows, heating, ventilation, lighting, electrical service, partitions, doors, hardware, etc. These documents are then issued to qualified selected builders who submit competitive proposals outlining the building design, materials, construction methods, cost and other pertinent information related to the building that they would build within the scope of the request for proposal document. The degree of detail included in the request for proposal document, and in the proposals depends entirely upon the judgement of those involved in the project. It is interesting to note that the more specific the request for proposal document, the closer it approaches the traditional architect's specification. In addition, the more protection that is built in concerning the requirement for professional design and professional supervision, the closer the system approaches the traditional system.

The principal advantages of the bid-design approach system are as follows:

(a) The builder has a full opportunity to use his expertise in selecting the building materials, methods and techniques that he feels are appropriate for the project.

(b) The approach can encourage a full range of proposals from traditional on-site construction to prefabricated systems, and the owner can select from these proposals that have price tags attached.

(c) Time can be saved if shop drawings are prepared and construction commenced when a proposal has been accepted.

(d) There is an opportunity to save money through innovation proposals, and through possible savings in professional fees.

The principal disadvantages of the bid-design method are as follows:

(a) The owner does not have the professional relationship with the architect, consulting engineers and construction manager that is possible in other approaches.

(b) There is a danger that the quality of construction might suffer since proposals are normally considerably less comprehensive than architectural specifications.

(c) Review and approval bodies do not have the full opportunity to examine working drawing specifications at the time that cost commitments must be made.

(d) It is quite possible that the building design, construction methods, etc., of all proposals could be lower in quality than those that would have resulted from the use of more traditional approaches.

The Bid-Design Approach had its start in building types such as office buildings, factories, warehouses and apartment buildings where developers used economical construction methods to construct buildings for rent, lease or sale on speculation. The expertise built up by these developers was put to use by business, industry and housing authorities who needed new facilities. The Ontario Ministry of Housing has made a conscious attempt to use this approach, and has developed a number of sophisticated requests for proposal documents for senior citizens housing, students' housing and subsidized public housing.

Several School and College Boards in Ontario have had experience in the use of the Bid-Design Approach. Their experience has been satisfactory - a good building at a reasonable cost. However, the Ontario Ministry of Education has expressed some reservations because of the difficulties in staging approvals, and the lack of quality control and professional content in the design and construction process.

One school board in Ontario which has used the Bid-Design approach to some extent is the North York Board of Education, where two large secondary schools were built in this manner in the early 1970's. While the School Board itself was quite pleased with the end result, there were limitations. Typically, in the North York case, an architect and a general contractor would team up to submit a proposal on a school building. One of the fears of the school board was that they would receive too many proposals from builder-architect teams when only one team could be selected. Unsuccessful teams, having absorbed heavy up-front costs, might refuse to submit proposals on future projects. However, this fear proved to be unfounded in the case of the North York Board of Education.

Seven submissions were received by the North York Board of Education for the building of one school, two or three of which were felt to be courtesy bids by general contractors who had done work for the Board in the past. About half of the submissions indicated a well thought out approach to the design and construction of the school within the guidelines of the budget criteria. The North York Board has subsequently learned that the developers lost money on the building of their schools, and has not pursued this approach since that time.

One of the school boards in Manitoba has considered using this approach on a number of occasions. However, they are concerned about the amount of time required to write the detailed specifications for the proposal and the amount of work that is necessary before tenders can be called. Second, they feel that the mechanical and electrical equipment installed into the building might not be of the quality that the school board would normally seek in their own detailed specifications.

The Manitoba Board of Education has used this approach, however, in the development and building of their pre-engineered schools (discussed elsewhere in this report). In these cases, the school board have not asked that the builder submit detailed working drawings or specifications. Instead, they go right from the performance specifications to the actual construction phase using the builder-developer's own detailed specifications.

(v) The Systems Approach

The growing complexity of the physical and functional requirements of building, the increasing sophistication of the building industry and the accelerating costs of on-site labour have all contributed to the development of factory-built systems. These systems appear in varying degrees in almost all buildings. Some of the most obvious examples are as follows:

- factory produced precast concrete wall panels or insulated metal wall panels in place of masonry,
- combination heating, ventilating, air conditioning systems in place of individual units,
- factory produced, demountable partition assemblies in place of lath and plaster on stud walls,
- factory prefabricated mobile buildings in place of structures on site,
- factory produced insulated metal permanent buildings in place of buildings built on site.

Most of these types of systems were developed by industry in response to a general need - not for a specific project. As mentioned earlier, approaches such as the Traditional Approach, Construction Management, Project Management and Bid-Design Proposal are not conducive to innovations that require changes to current methods and techniques. At best these approaches are responsive to the systems. Once the systems become available at reasonable cost, they can be used on specific projects where such use is appropriate.

During the 1960's with a notable exception it became apparent to some people that school facilities lagged far behind industrial and commercial facilities in their use of contemporary factory built components. In addition, the buildings were rigid in design, inflexible in use, and were subject to functional and physical obsolescence.

A number of conscious attempts were made to improve the situation.

The S.E.F. system developed by the Metropolitan Toronto School Board in the late 60's combined the talents of educators, architects, engineers and members of the construction industry involved in the provision and use of school buildings. At that time there was a shortage of school space within the Metro boundaries, making it possible to encourage the building industry to create innovative systems that could be applied to a number of new buildings constructed in a short period of time. Twenty-four schools were built, nineteen in one tender package and five in another.

Keys to the success of the S.E.F. system are a thorough understanding of the trends in educational methods, the nature of space required, the degree of flexibility and all other factors affecting the use of space, and the ability to produce in volume. The academic requirements for the program grew out of one of the most comprehensive evaluations of teaching and learning ever undertaken in Canada. Emerging from this were the following objectives: "To satisfy the terms of reference, a building system is needed which offers the following features:

- flexibility including quick rearrangement of interior walls, heating, ventilating and cooling, lighting equipment and storage and caseworks; provision for indeterminate electronic requirements; expansibility,
- quality and speed of construction,
- long-term reduction of school building costs,
- freedom of design,
- stimulation of interest amongst users in exploiting the potential of buildings that can be readily changed."

The process used by S.E.F. followed four stages:

- establishment of user requirements in great depth,
- establishment of performance standards for building sub-systems and the system as a whole,
- the establishment by the sub-system bidders of compatibility and integration with other related sub-systems,
- testing of component or systems to ensure that they meet the performance standards set.

It is interesting to note that the sub-systems were not organized into the building trades normally associated with architectural specifications. Instead, each sub-system often overlapped a number of trades. The list of sub-systems was as follows:

1. Structure
2. Atmosphere
3. Ceiling - Lighting
4. Interior Space Division
5. Vertical Spin
6. Plumbing
7. Electric-Electronic
8. Caseworks
9. Roofing

The results of the S.E.F. system have been somewhat mixed. The fundamental requirement for flexibility has been achieved, and S.E.F. schools have many features that could not have been obtained at comparable cost using the Traditional Approach. Features have also been built in that should help in reducing operating costs such as heating and maintenance. The buildings have not achieved overall savings in capital cost over conventional schools, but they have provided additional features within the same general capital cost. The buildings have been critized because of their rather stark, barren appearance.

One of the greatest benefits of the S.E.F. program has been the introduction to the building industry of innovative systems that are now available at reasonable cost. Ceiling-lighting systems, interior space divisions, flexible atmosphere (heating, ventilating, air conditioning) systems and casework elements are examples of these innovations.

In the late 1960's, the Montreal Catholic School Board, with the help of the Educational Facilities Laboratories in New York, began research into a new system of building schools. With a staff of architects, engineers, economists and pedagogues, the board did research on existing facilities along with present and future requirements for school facilities. Using the input from 30 separate committees, the board drew up a list of 11 basic school components along with their basic requirements. The components included structure, lighting, ventilation and electrical systems. Performance specifications were drawn for the five most important components that comprised approximately 45% of the school structure. The outside structure was not included so that individual architects could have more freedom to design. This avoided one of the problems of the Toronto S.E.F. system which set out the requirements for 95% of the structures, including the exterior shell (the similarity of the Toronto schools and the resultant controversy had almost killed the system in Toronto). With plans for its new Recherches en Amenagments Scolaires (RES) system, the board went to industry to undertake the actual building based on performance specifications prepared for the basic components. It was stressed that these components had to be compatible. Space had to be flexible. Speed in design and construction as well as economy were paramount.

The RES system did produce flexible buildings, and schools were built more quickly than traditional schools. It is doubtful that cost savings were achieved. However, the schools produced many innovations that would not have been possible using more traditional methods.

The principal advantages of a Systems Approach to the provisions of facilities are as follows:

(a) It is possible to produce innovative multi-trade factory built systems for school facilities provided that the volume of space needed warrants the effort required by manufacturers in the building industry.

(b) The Systems Approach has produced facilities that respond to the needs for flexibility that permits immediate changes to the sizes of spaces, and reduces the possibility of functional obsolescence. However, these characteristics can also be built into schools constructed by the use of other approaches if the requirements for flexibility are stated in the original space needs document.

(c) The Systems Approach encourages the building industry to produce innovative systems, which become available to designers and builders of individual school projects.

(d) If the volume of space required is large enough, the systems approach has been able to include additional features at the same cost as conventional schools without those features.

The principal disadvantages of the Systems Approach are as follows:

(a) The approach is impractical for individual projects where it is uneconomical for the building industry to create innovations on a multi-trade basis.

(b) Many of the systems that are needed to create the kinds of flexible spaces that respond to educational methods are now available and can be used in other approaches to providing facilities.

(c) The Systems Approach as described above requires the expenditure of a considerable amount of time by educators and professionals in the building industry to draw up the documents necessary for competitive tendering. The less time that is expended, the more the Systems Approach becomes like the Bid-Design Approach.

One Vancouver-based firm of architects has recently used the system-oriented method of school construction. In the last ten years the firm has designed some $25 to $30 million worth of these buildings with savings in the order of 17% when compared with traditional structures of similar size. The system consists basically of a large rectangular block, a steel frame - and some four other component parts. The buildings are simple in configuration and built on one level to avoid a tortured exterior shape. A 24 feet by 24 feet grid is used to take advantage of readily available building material sizes.

The Systems Approach is not being used to any great extent by school boards in Canada, according to our interviews. The general restriction of this process in a good many provinces is that school construction is too small to warrant the setting up of the Systems Approach. On this basis, only four Canadian provinces, Alberta, British Columbia, Ontario and Quebec, are of sufficient size to justify using this approach. In Ontario, this approach was used during the late 1960's and early 1970's, and despite all the good things that could be said for this system, it is doubtful that it will be carried on in its present manner, simply because the peak building period of the late 1960's and early 1970's has now passed.

Summary

When applied to permanent, new construction, none of the above approaches responds well to the problems of unrealized population projections, declining enrolments, shifting population and other situations that result in excess space becoming available in the wrong situations. It is the nature of permanent buildings that they can be designed to expand and be built to last, but they cannot be readily contracted or eliminated. The solution to these problems must be found in methods other than constructing permanent facilities using any approach. (Note: these other methods of providing facilities are dealt with in later subsections of this report.)

There are situations where the construction of permanent new facilities is the most appropriate course of action. The conditions that apply to these situations include confidence in the long-term forecasts of student enrolment, and forecasts that indicate a static enrolment or a relatively steady growth with no major declines in enrolment over the long-term.

In these situations, none of the approaches described earlier should be rejected out of hand. Each has advantages and disadvantages which should be considered in its application to a given situation. Examples of these are as follows.

(a) Maximum Control

If local School Boards and Alberta Education wish to have the maximum opportunity of controlling the design and cost of a project, then the Traditional Approach should be used since it permits regular reviews and approvals at each stage of the design and construction process.

(b) Maximum Involvement of Contractor or Developer

If there are specific locations or points in time where it is appropriate to make the maximum use of either contractor or developer expertise, then Construction Management or Developer Proposals should be considered, providing there is a thorough understanding of the risks involved.

(c) Time

In situations where time is of the essence, Construction Management with or without Project Management is likely to be the best approach.

(d) Capital Cost

Capital cost can sometimes be reduced by controlling cost through Project Management. In cases where costs are escalating rapidly, "fast-tracking" through Construction Management might save money. In certain situations, a developer can save money through exercising his know-how and reducing the cost of professional fees.

Where innovations in construction methods are warranted and there is sufficient volume of construction, it might be possible to use a Systems Approach.

It is unlikely that one approach is superior to another in terms of producing buildings that cost less to operate. The requirements for this should be built into the Owner's original needs, and should become part of the mandatory requirements of the building whatever approach is used.

It is doubtful that needs for flexibility and expansibility are satisfied more fully in one approach over another. The Systems Approach has a reputation of being superior in this regard. However, the present state of the art is such that all approaches can produce flexible, expansible buildings provided that the requirements are well documented in the original space needs document.

It is difficult to say which approach is able to produce the most pleasing building from an aesthetic point of view. An imaginative architect can create a pleasing building under the Traditional Approach, Construction Management or Project Management. With the Bid-Design Approach, the Owner can select from among a number of design alternatives. However, he has no guarantee that the most pleasing building will be the least cost proposal. Nor can he be assured that any of the designs will be as pleasing as the design that would result from other approaches.

On the basis of usage, the Traditional Approach appears to be judged best for most situations. However, planning and funding procedures should not preclude the possibility of using other approaches, and School Boards should be encouraged, indeed required, to explore all possibilities each time there is a need for new facilities.

(b) Installing Transportable Units (or other forms of Relocatable or Disposable Facilities)

The use of transportable or relocatable units is one solution to the problem of providing facilities for immediate enrolment needs that are likely to diminish or cease to exist over time. In such cases the nature and extent of the relocatable elements should be closely related to the best present long-term forecasts of pupil enrolments. For example, if such forecasts indicate that the enrolment would never fall below a level that could support a core unit (including minimal classroom facilities, library, audio-visual rooms, washrooms and other common facilities) then the "Core School" concept should be considered. If, on the other hand, the enrolment forecasts indicate the possibility of a termination of the school through future amalgamation or lack of need, then a fully relocatable or disposable facility would be more suitable. (Note: in this latter situation, there might be a strong case for leasing or renting facilities during the period of need, as described later in this section of the report.)

The "Core School" concept, the "Relocatable School" concept and the "Disposable School" concept are described below.

(i) Core School

There are a number of variations of this concept. In its simplest form the "core school" comprises a permanent building containing facilities such as a laboratory, library, gymnasium or multi-purpose room, administrative offices, washrooms and basic classroom space for minimal enrolment. All additional spaces required for the short-term enrolment forecasts comprise factory prefabricated units that can be readily installed and removed as the need for them changes over time.

A recent example of a Core School, actively encouraged by Alberta Education, is the Madonna Separate School located in the residential community of Sherwood Park, Alberta. The Department of Education recognized the fact that subdivisions have varying family patterns over many years, yet an almost constant initial condition is that the greatest number of students is usual in the first few years, thereafter declining significantly. With dropping enrolments, expanding peripheral subdivisions, shrinking "central area" enrolments and rising construction costs, the Board decided to plan the building of a community core school to utilize to the maximum the "expandable core" concept facilitated by the regulations of Alberta Education. The Board used the Traditional Approach to the provision of facilities, retaining an architect and selecting a general contractor through competitive tendering. Separate tenders were called for the portable classroom units.

The core facilities designed as permanent new construction were as follows:

6 general classrooms
1 E.C.S. (kindergarten) facility
1 science experience classroom
1 ancillary room
1 library
1 gymnasium (2 station)
1 stage - ancillary
2 station lunch - ancillary rooms - non-instructional areas
  to serve up to 500 students
staff areas

Transportable facilities were as follows:

8 "plug-in" classrooms with associated transportable corridors.

The library and a number of the adjacent classrooms in the core facility were "open" in nature to respond to changing educational needs. Other permanent facilities, and all of the plug-in units were essentially closed classrooms. Each of the transportable classrooms has its own heating/air conditioning unit, and the electrical systems are also designed for easy installation and removal of classroom units.

It is interesting to note that the capital cost of the transportable units was $25.36 per square foot, including installation, and foundations. This is within a range of $24 to $32 per square foot (depending on architectual specifications) generally estimated by builders in the area. The comparable cost of the new permanent facilities was $31.15. Thus, the experience in this school indicates that the capital cost of transportable units with one hour fire rated walls is approximately 82% of the capital cost of permanent new construction. It is likely that this percentage figure would increase if comparisons were made on the basis of constructing only classroom space since classroom spaces are generally less expensive to build than libraries, laboratories, washrooms, gymnasiums, etc. An architect with the Ministry of Education in Ontario uses a rule of thumb comparison that gives an equal capital cost to permanent and transportable facilities, assuming that the transportables meet the fire regulations for permanent construction.

In addition to the Madonna Separate School in Alberta, there are a great number of examples of the core school concept in other jurisdictions in Alberta. In addition, within every other province, the school boards are using the core school concept to some degree by using portables to provide space when it is required. In Etobicoke and Metropolitan Toronto, core schools are built so that they will be used to capacity for at least ten years. If additional space is required during this time, it is supplied by the installation of portable units. The Peel Board of Education is designing core schools which are built to accommodate 260 elementary students. Each school is designed so that a portable complex of four units (accommodation for 120 students) can be built on each side. If necessary, during peak enrolment periods the school could grow to 740 pupil places. The portable units can be added or subtracted as required during the schools functioning lifetime. In Scarborough, the basic elementary unit is 12 classrooms plus two kindergartens.

The core school concept appears to be an integral part of school planners' thinking in all provinces during the 1970's. There is, however, divergence of opinion as to what should be the minimum size of the core unit. This is dependent, to some degree, on whether a school is an elementary school (grades K to 6), a junior school (grades 7 to 9), or senior school (grades 10 to 12 or 13). In Ontario, each individual school board has some autonomy in deciding what this core school size should be. However, the Ministry of Education is able to control the minimum school size to some extent through its grant program. The Ontario authorities use a minimum size guideline of about 1,000 to 1,200 pupils to achieve an economical operation for fully programmed secondary schools from a facility standpoint. If a senior school is built for 800 pupils, an underutilization factor develops for special rooms such as gymnasiums and shops. The cost per pupil increases. In addition, land size is a critical variable due to underutilization. Similarly, in Ontario, 210 pupils (7 grades x 30 = 210) is considered to be the minimum for elementary schools. However, no firm minimums have been set because of the sparcity of population which could be encountered in outlying areas, and the distance that pupils would have to travel is also considered when contemplating schools smaller than 210 pupil places. For an elementary school to be most economical from a community standpoint, a minimum size should be increased to 350 pupils. At this enrolment special spaces can be introduced to appropriate to community activities. In the senior elementary schools or junior schools, 350 pupils would also be required before special spaces like art rooms and laboratories become fully utilized. While the senior elementary school is allowed to range from 350 to 700 pupils, 525 pupils would qualify for any type of special space. It was reported to us that for senior schools, generally speaking, educators object to these exceeding 1,500 pupil places.

It is evident from our discussions with educators in the various provinces that the core school concept has become a necessity to accommodate the peaks and valleys which can occur in student population. It has the constraint in that minimum school size must be established to justify the expense necessary to provide students with a full range of courses and options, and the facilities required to provide these courses. In some of the more remote areas, the facilities such as gymnasiums or general purpose rooms may not be justifiable from a purely academic standpoint, however, from a community standpoint, facilities such as these meet a real need within the community.

There do not appear to be any hard data concerning the anticipated length of life of transportable units before substantial renovation or replacement is required because of physical deterioration or obsolescence. It is likely that transportables wear out sooner, and therefore are more expensive than permanent construction when compared on the basis of continuous existence in one location. However, it is clear that this capital cost advantage would change to favour transportables after one move from a school that has no need to a school with a demonstrated need for classroom space. Subsequent moves would increase this advantage in favour of transportables.

It is probable that in terms of maintenance costs a small premium is paid for the decentralization of mechanical equipment inherent in the use of plug-in classrooms. There does not appear to be evidence that fuel and power costs are higher, particularly in installations that use the maximum number of common walls between units. Plug-ins can, if desired, be entirely interior spaces as noted on the preliminary studies of the Madonna School.

Transportable units, because of their light construction, do not give the full freedom of architectural expression possible in buildings of more permanent construction. On the other hand, the ease and speed of installation of transportables cause minimal inconvenience during construction programs that take place while facilities are in use.

Within every province and for all school boards, the use of transportable units is very much in evidence. Many school boards have several hundred of these units. For example, within Manitoba there are 400-500 transportable units now in use. They are added to existing core facilities to handle peaks in student population and can be relocated to other schools as the need arises, when the peaks at their present locations have passed. In some cases, transportable units are attached together to form a school complex. This has been done for example, within the Peel Board of Education near Toronto and the Toronto Separate School Board. In these instances, transportable units are joined together to form a complex containing all the amenities of a conventionally built school. This is done in areas where rapid growth has necessitated a school before conventional schools could be built, or the demand of school facilities was not expected to be of long duration, or where the expected period of need could not be predicted accurately, but was felt to be short. For example, in Newfoundland and Manitoba, the school complexes made up of transporable units have been built in communities in which, because of their natural resource base, either fishing, logging or mining, the life span of the community could not be projected beyond a few years. The cost of transportable portable units seemed to vary among those interviewed, although $20 per square foot on a gross basis (including site preparation) seemed to be about average. One manufacturer of transportable units in Ontario indicated that its standard 24 by 32 foot unit sold for $10,000 excluding site preparation, delivery or service installation, at about $13 per square foot basic price. One transportable complex built in Peel in 1974 with eight 24 by 32 foot transportable classrooms plus three transportable units at 24 feet by 36 feet used as administration module, washroom, and library was costed on the following basis:

Complete Building	$157,000
Furniture and Equipment	20,000
Service and Parking Lot	19,000
Contingencies	4,710
Sub Total	200,710
Less 3% Federal Sales Tax	4,851
Total	$195,859

The gross cost per square foot for this complex was then $22.42 a square foot.

The Toronto Separate School Board provides another example of transportable units used both as additions on the core units or as part of a school complex building. In its experience, it found that transportable units used to cost about $14 to $15 per square foot, however, to comply with recent fire marshall regulations, these better built and safer units now cost in the range of $22 to $23 per square foot or approaching the 80% to 85% cost of a new building.

Ownership of the transportable units can vary within provinces. For example, in Prince Edward Island, all the tranportables are owned by the province and shared by the school boards. In Toronto, the Metropolitan Toronto Board of Education (which parallels the Metropolitan Toronto political boundaries and includes several school boards) owns the transportable units and leases these to the school boards within Metro Toronto. The school boards must pay for moving and installation charges for establishing the transportable units. (N.B. In Alberta it is free.) In some cases, the transportable unit manufacturers lease the units to the school boards for a typical period of five years. Leases of as short a duration as two years have also been negotiated. The Halton and Oxford School Boards in Ontario are currently leasing transportables. In Prince Edward Island, the province leases the transportable units for five years and then purchases them after that period of time.

The transportable units are in many cases built to the manufacturer's specifications, but in some instances, the school boards will create their own specifications and then call for tenders from manufacturers for transportable units, awarding the contract to the lowest bidder. In general, it is considered that the operating expenses of a transportable unit were slightly higher than those for a conventional building in terms of heating and cooling. This certainly is the case in Prince Edward Island where transportables are all electrically heated, which is a particularly expensive form of heating for that province. In Ontario, the Toronto Separate School Board indicated that with older transportable units, which cost about $15 per square foot, operating costs were higher. Because of the new regulations, the higher quality new units result in operating costs that are comparable and sometimes lower than for conventional buildings.

(ii) The Relocatable School

As stated earlier, there are situations in which school enrolment could decline to a point where a school building became unnecessary or no longer viable. Where such situations can be forecast in advance, the construction of new school buildings would appear to warrant even more attention to demountability and transportability than that normally given to core schools.

Demountable features have been built into many new buildings. For example, precast concrete or steel wall panels are more demountable, and reusable than masonry walls. Similarly, precast concrete or steel roof decks or floor decks are more easily removed than poured-in-place concrete. Similarly, steel frames can be taken down more readily than reinforced concrete frames. In spite of these features, it is not common practice to design school buildings using these elements in such a way that they can be disconnected from an existing school building and reused elsewhere. A more dramatic concept is presently being used in British Columbia. An example of this is the building recently completed for Douglas College in Vancouver. Additions to Douglas College have been made in three phases. The initial phase involved the factory assembly of 60 10' by 60' interconnected modules. Twenty more were added in 1973. A more recent addition of 18,000 square feet will provide the college with a total of 66,000 square feet of relocatable space. The Douglas College project is one of four regional colleges factory built and installed by one manufacturer. In addition to the special units described above, the company produces prefabricated modular units in a number of sizes then assembles them on site. As well as classrooms, it provides units for cafeterias, libraries, and any other facility needed by the school. The manufacturers claim that the entire building can be added to, diminished, or moved simply by disassembling the modules and trucking them elsewhere. Proponents of relocatable schools state that their increasing popularity is a result of several factors, including the speed of manufacture, the increasing mobility of the population, and the fact that they can be rented or leased rather than owned outright. A Vice-President of the Manufacturing Company points out that, "Douglas College, for example, is on leased land, and if at some future date it becomes necessary to move it, it can be done fairly easily. At the same time, the building itself is attractive, and contains all the facilities expected of a college constructed on-site".

Proponents of the system do not appear to make claims of savings in capital and operating costs. For this reason it can probably be assumed that such savings are minimal when comparisons are made with permanent construction on an equal basis. Nor do they comment on the comparative life span of the facility. However, there is no doubt that cost savings would become apparent after one relocation, and these would grow with each subsequent relocation.

(iii) The Disposable School

A pre-engineered or limited life building was built in the Province of Manitoba. This is a metal building placed on a concrete slab or grade with pile support if required. Within the metal building there is a 70 foot span and typically it is a standard metal deck roof with a 1-1/2" ridged insulation. The exterior could be described as spartan, however, the interiors typically have dry wall insulation and are claimed to be as aesthetically pleasing on the interior as any conventional building. These disposable or pre-engineered schools are built in communities which are too small to justify a permanent structure or where bussing is an unacceptable alternative for the junior (K to 6) students or where the life span of the community is uncertain. These schools are built at about 67% of the cost of conventional buildings. However, the life span of some of the elements of the building could be as long as conventional buildings. It is not intended, however, that once these buildings have completed their function as a school that they be dismantled and moved but rather that they be disposed of on site in a manner best suited to the circumstances.

These schools are built by general contractors who build only to general specifications. Two other reasons given for building pre-engineered "disposable" schools were: (i) the cost of shipping concrete and steel construction material to remote areas might be prohibitive, and (ii) the building season in northern areas may be too short to allow for conventional building techniques.

Summary

There is normally some "systems" application in each project that involves the use of transportable units or relocatable or disposable facilities. However, the use of such methods does not preclude the use of any of the approaches to the provision of facilities described earlier in this section of the report under the heading of "Constructing a New Permanent Building". The Traditional Approach, Construction Management, Bid-Design Proposal or the Systems Approach could all be used solely or in combination, and the advantages and disadvantages of these approaches listed earlier would also apply.

In comparing the use of Transportables, Relocatables or Disposables with the construction of permanent new facilities, the following factors should be taken into consideration.

First, the principal advantages of their use are as follows:

(a) Transportables and relocatables respond well to the problems of unrealized population projections, declining enrolments, shifting population and other situations that result in excess space becoming available in the wrong locations.

(b) Except in the case of disposables, it is unlikely that significant capital cost savings are realized in the first use. Subsequent uses result in substantial savings.

(c) Core schools permit all the features of "open" flexible planning in the core section together with easily removable "closed" type classroom units in the transportable section.

(d) Fully relocatable schools provide the ultimate flexibility in response to declining enrolment, including the ability of ceasing operation in one location and relocating in an area of need.

(e) Transportables, relocatables and disposables can be used without major constraints to the approach to the provision of facilities. The Traditional Approach, Construction Management, Project Management, Bid-Design Proposal or the Systems Approach can all be adapted to the use of these types of facilities.

(f) Construction time can be saved.

(g) Additions and removals can be achieved with least disturbance to existing operations.

(h) Provincial authorities can maintain control at all stages of the planning and construction process, if desired.

(i) The more remote the location, the more likely that transportables will cost less than permanent construction (because of savings in transportation costs).

(j) Transportables are more easily installed in extreme winter weather conditions.

The principal disadvantages to the use of transportables and relocatables are as follows:

(a) It is likely that the installation of transportables and relocatables would be more costly than permanent new construction if they were to remain as useful facilities in one location for a long period of time (say, 35 or more years). Construction methods are likely to lead to more severe maintenance costs and physical obsolescence - the more economical the initial building, the more rapid the deterioration.

(b) School boards could build up a substantial inventory of transportable or relocatable units without a matching need in the long term. This could be overcome by exchanges between school boards, Provincial ownership of these units, or by leasing units from manufacturers. In the latter case, costs would exceed original capital costs in the long-term.

(c) There do not appear to be operating cost savings, except in the sense of not having to pay for heating, cooling, and maintaining unnecessary space.

(d) Transportables and relocatables do not offer the full potential for architectural expression.

(e) Factory produced elements apply a rigidity in room sizes, prefabricated units, etc., that constrain to some degree the imaginative use of irregular shapes, angles, etc., that can be more achieved in new permanent buildings.

(f) Disposables by definition wear out sooner than permanent facilities.

Conclusion

School boards should be required to consider and compare the advantages and disadvantages of the use of transportable elements and relocatable or disposable schools in all situations where there is insufficient data to show long-term needs for full permanent facilities. This is particularly important where there is a possibility of unrealized population projections, declining enrolments, shifting population and other situations that could result in excess space becoming available in the wrong locations. The extent to which the school is built using transportable units or relocatable construction should be geared to the best present forecast of long-term enrolment.

2. FACILITY RENOVATION AND/OR ADDITIONS

In most cases, School Boards should be required to examine fully the advantages and disadvantages of renovating existing buildings, and adding to them if necessary, before discarding this option in favour of new construction.

A trend towards renovating has become apparent in many urban centres. The reasons for this are two-fold according to Mr. J.L. Canty (Superintendent of Administrative Services for the Department of Education, British Columbia). The first is a cost factor. As well, there is a decline in the need for new schools, and this has led to school boards beginning to look at renovating older buildings. Mr. Canty points out that, "often the insurance corporation and fire department will look at an older school building and find that it doesn't come up to today's requirements. But instead of building another school, the Board is more likely to re-do the school entirely, bringing it up to present standards".

During our interviews we found that all school boards from coast to coast, including Alberta, renovated or added to their existing school buildings. In most provinces, new facilities have priority over renovating existing facilities, in terms of receiving Ministry funding. The respective Ministries of Education would review all applications for renovating and/or adding to facilities and approve these on a basis of highest priority or need.

School authorities in Ontario indicated that either the fire marshall or the health department officials can approve or cause a facility alteration. Ontario also makes a distinction between upgrading and renovating. Upgrading occurs after a building is twenty years old, and work is done mainly in the areas of electrical and mechanical systems. Renovations occur after a building is thirty-five years old. Renovation usually implies the re-capitalization of the building.

In Manitoba the pre-engineered unit is used as an inexpensive addition to schools. However, the use of this facility as an addition is restricted to shops.

Many school boards are designing schools so that additions can be added at a later date but still blend well with the school's architecture. For example, Halton County Board of Education has built two secondary schools for 1,000 students each. They can be expanded to 1,500 students without putting stress on the support facilities or site.

The reason for renovating a school can be the need for space or for changing space requirements. Often gymnasiums, cafeteria, corridors, auditorium and storage spaces are renovated to meet new space standards. In Missouri, U.S.A., more space was required in a 40 year old high school. The architect determined that use could be made of the four storey open court. A roof was placed over the court at the third storey level, old exterior walls were removed from the school and a two storey library was created at the centre of the school.

In the U.S. many school boards are becoming very sophisticated with their modernization and renovating programs. In some areas, the systems approach has been used to purchase packaged modernized classrooms which should include all systems support. This, for example, is being done in San Francisco where classrooms were renovated in the Le Conte School. The total price of the package was known in advance because the manufacturer of the components installed them and guaranteed their cost.

Also, in San Francisco a school board developed a computer model of all school facilities called the Computerized Facilities Inventory (C.F.I.). With this computer inventory the level of all school components is known and decisions can be made on the basis of need or budget limitations as to the best alternatives for school renovations. Using their computer program has started a large-scale systematic renovation program involving the following eight steps:

a) Identify areas of concern, such as structural stability, lighting, acoustics, etc.

b) Develop standards for identified items.

c) Survey the existing facilities using the C.F.I. and compare standards.

d) Document resulting deficit.

e) Tabulate the cost of corrective action.

f) Complete cost benefit tables.

g) Initiate specific projects.

h) Analyze the cost of these projects and recycle into the cost benefit tables so that program budget can be evaluated.

This approach may not be justifiable for each individual school board but it may have merit on a provincial basis. It would also help the provinces to be more systematic in determining their priorities for grant allocation to the school boards.

Another approach is one which was used in Portland, Oregon where they hired a directer to oversee their renovation program, with the understanding that the director would resign when the project was completed. In yet another situation, Kansas City chose to hire an architectural firm to coordinate their modernization and renovation programs rather than hire a director. The key factor in renovation projects is the need for facilities. In areas where there is a general and permanent decline in enrolment, boards should look into the possibility of consolidating operations in one location instead of two, or perhaps in two locations instead of three. These kinds of studies might result in the closing of some schools while renovating or adding to others. Implications of distance, transportation, etc. would have to be carefully assessed in each case. However, except in case of extreme obsolescence and deterioration, most renovation projects can be designed to be less costly than comparable new buildings.

Each situation has to be judged on its own merits. There are cases where the capital costs of renovation are substantially less than new of construction. However, the existing roofs, interior walls, windows, ceiling heights, building configurations, etc. (if left basically unchanged) require that penalties be paid in terms of heating, cooling and maintenance costs.

If additions are part of renovation projects, the options of permanent construction, transportation and relocatable facilities (as described earlier) still apply.

In addition, there are choices that can be made among the various approaches to the process of providing the renovated and expanded facility (including the Traditional Approach, Construction Management, Project Management and Developer Proposal).

In assessing the merits of renovating existing school buildings over constructing new permanent facilities the following pros and cons should be considered.

Advantages

(a) The capital cost of full renovations can usually be made to be less than the capital cost of comparable new construction.

(b) A renovation project does not increase the total inventory of schools presently in existence.

(c) Existing schools are often situated in locations that would be costly to purchase if the demand for facilities (enrolment) were to increase unexpectedly in the future.

(d) The public mood is one that favours the retention of existing buildings. Ironically, the older the building the more this is evident.

(e) The location of a school building that has a current declining enrolment can become the focal point of measures to consolidate facilities within a broad area.

(f) Additions to existing facilities can take advantage of options such as transportables and relocatables if there is a need for that kind of flexibility.

(g) Renovation and/or additions to existing schools are adaptable to the Traditional Approach, Construction Management, Project Management or Developer Proposal.

(h) There is nothing that would preclude Alberta Education or others from maintaining control of renovation and addition projects through a staged approval process. However, it should be noted that the final costs of renovation are almost always considerably higher than budget estimates.

Disadvantages

(a) Existing buildings are frequently located in areas remote from the greatest need.

(b) Operating costs (heating, ventilating, cooling, maintenance, etc.) are generally higher in renovated facilities than in new buildings, designed to meet current standards.

(c) In spite of the efforts to the contrary, it is difficult to remedy all elements of physical and functional obsolescence.

(d) Full renovations can cause inconvenience to ongoing operations.

(e) It is generally more difficult to achieve an "open" flexible arrangement in existing spaces because of the linear designs normally associated with existing school buildings.

(f) There might be insufficent land for outdoor activities.

Conclusion

In areas where new school facilities are contemplated and present facilities exist, school boards should be required to explain why existing facilities and land are not being fully used by means of renovation and/or additions. This explanation should include a study of the inventory of space and the enrolment of schools in the surrounding area and an assessment of the effects of consolidation on utilization, distance, transportation implications, etc. Studies should be made concerning capital and operating costs of renovating and adding to existing buildings compared with the other options available to the

School Board. The implications of physical and functional adequacy should also be considered.

In this regard, we believe the Alberta School Building Restoration Program is an outstanding program that should continue to be encouraged.

3. RENOVATING BUILDINGS ORIGINALLY BUILT FOR OTHER PURPOSES

There are few instances where school boards have acquired and renovated existing buildings originally built for some other purpose, although this practice is not unusual in other fields of endeavour. For example, old school houses have been converted to residences. Churches have become offices or clubs. A railroad station in Toronto is now a liquor outlet. Loft buildings have made first class office space. Apartment buildings have become hospitals. Live theatres now exist in many old spaces such as fire halls, post offices, etc. In each case there was a combination of cost, desirable location, appropriateness of space and availability that tipped the scales in favour of this option. In certain cases the unique architectural or historic quality of existing buildings was an important factor. Whatever the reasons, schools have lagged behind other organizations in using this method to accommodate its activities.

There are a number of examples in Alberta and elsewhere where Community Colleges have taken over existing factories or loft buildings. Perhaps the kinds of technical programs offered by such colleges are more adaptable than school programs to the open, flexible space available in these kinds of buildings. However, as educators place greater emphasis on the changing needs for spaces of different shapes and sizes and other features of flexibility, then existing flexible buildings containing open spaces become more appealing.

There are a number of existing buildings constructed in the United States that have been converted for educational use. The following are examples from the project library turned over to Alberta Education.

- A former garment factory converted into a high school annex for Pennridge School District, Perkasie, Pa.
- A former Synagogue converted to a school for pre-school children, Brooklyn, N.Y.
- A former warehouse converted into a child development centre, Cambridge, Mass.
- A supermarket converted into a community learning centre, Washington, D.C.
- A former mattress factory converted into a public school, Bronx, New York.
- A former sardine factory converted into a school, Robinston, Me.
- A five-storey warehouse was leased and renovated for an "open" school for 500 children in St. Paul, Minn.
- A former Bathhouse converted into a high school facility in South Boston.
- A candy factory converted into a vocational high school in Chicago, Illinois.

There are other examples of this new effort to find space for educational activities in existing buildings. The Olney High School Annex in Philadelphia is an interesting example. The school is located in a former government testing laboratory. A formula was developed to estimate the value of the existing building compared with building a new facility. Application of the formula indicated that the testing laboratory had a value of 55% of the cost of new construction. The purchase or lease cost of the building was set at this amount, leaving 45% the cost of a new building for refurnishing within the overall cost of new construction. In Canada, the Toronto School Board has converted a warehouse to an adult education centre, and the Toronto Separate School Board has converted churches and community auditoria into elementary classrooms.

Many of the renovations of existing space used applications of "systems building" components such as integrated ceiling/lighting/air conditioning systems, room dividers and other elements applicable to the open spaces available in these old buildings.

In comparing the acquisition and renovation of existing buildings (built for other purposes) with other methods of providing facilities for schools, the following matters should be considered.

First, the principal advantages are as follows:

(a) Existing buildings such as factories or loft buildings are sometimes available in areas where there is a need for space, and where available land is scarce or non-existent.

(b) In some cases the cost of purchase plus the cost of renovations are less than the cost of a new building on a new site.

(c) If the zoning is favourable, an existing property in a good location can attract willing buyers if the school should cease to exist at a later date.

(d) Existing buildings containing open, flexible space can be renovated to contain many of the flexible components of systems buildings.

(e) Leased space in existing buildings can be disposed of at the termination of the lease.

The principal disadvantages of renovating existing buildings (built for other purposes) are as follows:

(a) Situations might exist that would change a number of the advantages listed above to disadvantages, for example:

- suitable existing buildings might not exist in an area of need,
- purchase (or lease) price plus renovation costs might exceed comparable cost of new construction on a new site,
- willing buyers might not exist if the school board wished to sell an existing building,
- existing buildings might have rigid, inflexible, inappropriate spaces,
- landlords might wish to evict the tenants of the school against its wishes at the termination of a lease.

Other advantages and disadvantages to this method of acquiring facilities are similar to those listed earlier under the heading "Renovating and/or Adding to Existing School Buildings".

Conclusions

The purchasing (or leasing) of existing buildings originally built for other purposes should be considered by school boards when they have a need for new facilities. If such buildings are available in an area of need, an assessment should be made of the physical and functional adequacy of the property, including outdoor spaces.

Estimates of cost of purchase (or lease), renovation costs and operating costs should be prepared for comparison with other methods of providing facilities. Due consideration should be given to the ability to dispose of the facility at a later date.

In short, this method of providing space should not be rejected out of hand if there is a possibility of it comparing favourably with other methods.

4. LEASING

It is normal practice for commercial and industrial organizations and others engaged in private enterprise to accommodate their operations in leased facilities. Sound businessmen are accustomed to assessing the options open to them and selecting the most appropriate option. Their organizations do not own facilities when it makes more sense to lease them. Alternatively, they do not lease facilities when it is better to build or buy. This freedom of selection in business has not spilled over into the public sector to any great extent except, perhaps, in the case of office space. Most other operations in the public sector such as health, education, justice, correctional services, and police are accommodated in premises built and owned by public bodies. A large inventory of facilities, presently in various states of repair and usefulness, has resulted. In defence of the policies that produced this inventory it could be pointed out that:

i) facilities should, if possible, be tailor-made to owner's requirements;

ii) until recent times, money for capital projects was a relatively inexpensive commodity to government;

iii) no one foresaw the rapid changes in owners' needs and operating methods, nor the demographic shifts that are now commonplace;

iv) a sophisticated development industry that could perform as promoter, designer, builder and landlord has only recently reached maturity, with the result that spaces for lease have not been readily available; nor could they be effectively produced;

v) funding procedures frequently provide financial assistance for new buildings, with no corresponding provision for leasing (which must be paid from operating revenue);

vi) government bodies have tended to separate the responsibilities (and personnel) involved in capital projects from those concerned with ongoing, annual operations - and have developed segmented procedures to provide maximum control and accountability in each category.

The above environment has not encouraged individual boards (concerned with health, education, etc.) to explore the possibility of leasing facilities instead of building them - the obstacles have been too great. However, the environment has changed, and now leasing is sometimes the best option.

In order to allow a true comparison between leasing and other options, the following conditions should exist: First, the cost of all options should be compared on the same basis - that is, the total costs of providing facilities whether built, purchased or leased. It is inequitable to have to pay leasing costs from operation revenue while construction costs are paid from capital grants. Secondly, the time period(s) selected for comparison should be the same for all options. Third, the above time period(s) should be selected to emphasize the impact on facilities of anticipated trends and/or abrupt changes in enrolment. This third consideration helps to ensure a realistic residual value for the buildings and property owned at the end of the time period(s) selected. The comparison would be distorted if a high residual value were to be placed on buildings and property at a time in the future when no demand for them exists either by the school board (enrolment) or by other organizations (say, developers).

EXHIBIT H

PRINCIPAL CAPITAL AND OPERATING COSTS

	Building and Owning		Leasing	
Item	Category of Estimate	Year Paid	Category of Estimate	Year Paid
Legal	Legal fees	1st year	Legal fees	1st year
Land	Land purchase, and demolition	1st	-	-
Construction	Architect's fees and construction cost for new building	1st to 3rd	Architect's fees and construction for tenant's (school board's) improvements	1st and 2nd
Building Operating Costs	Annual costs of lighting, power, HV and AC, plumbing, elevators, groundskeeping, cleaning, maintenance, security, administration, etc.	(1) 3rd to 20th incl.	Annual maintenance cost of tenant's improvements (assuming leasing costs, cover remainder).	(1) 2nd to 20th incl.
Leasing	-		Rent, (including taxes, etc.) parking, after-hours usage	(2) 2nd to 20th incl.
Improvements	Fees, construction costs, etc. for capital improvements (additions) over 20 years	Year(s) in which costs were incurred	Fees, construction costs, etc. for tenants improvements over 20 years	Year(s) in which costs were incurred
Less (Residual Value)	(Residual value of land and buildings)	20th	(Residual value of tenant's improvements)	20th

(1) Costs of lighting, HV and AC, plumbing, elevator operation, groundskeeping, cleaning, maintenance, security, administration, etc. generally increase at a regular annual rate over the twenty year period.

(2) Rental of buildings, grounds, parking, etc. generally increases at a regular rate at intervals that depend upon the lease agreement (say every five years). Certain charges increase in proportion to landlord's costs. Variations will also occur in response to changes in the amount actually rented, which in turn could be responsive to changes in enrolments.

Comparing Leasing with Building and Owning

Assuming that a school board wants to compare the costs of leasing against building over a twenty year period, Exhibit H opposite illustrates the kinds of capital and operating costs that should be estimated for each option.

These estimated capital and operating costs should be allocated into the year(s) in which they occur. These costs can then be discounted in accordance with current discount rates to give a true comparison between the two options based on the net present value of all future estimated costs.

The variations in individual situations preclude the possibility of identifying the better of the two options in all cases; nor is it possible to predict in advance which is better in one situation over different lengths of time. What might appear on the surface to be the better choice may be the worse on analysis. It is, therefore, worthwhile carrying out the suggested calculations (sometimes using a number of time periods) in each situation where leasing is a possibility. There are computer programs available to expedite the calculations.

In general, new construction is more favourable when:

- school boards and government agencies can borrow money at an attractive rate,
- the building will remain in use as a school for a long period of time,
- the residual value of land and buildings is high at the time this value is applied (either for use by the board or for sale to others),
- the building is fully utilized during the period of comparison.

Leasing becomes more attractive when:

- an appropriate space is available or can be provided by the landlord at a reasonable rent,
- tenant improvements are easily and economically installed,
- the amount of space that is leased can vary up - and particularly down - with trends in enrolment,
- the life-span of need for the facility is short,
- the residual value of the land and buildings is likely to be low at the time and value is applied,
- the school board does not have to own land as a hedge against an unforeseen future need coupled with a scarcity of land,
- the school board and fund granting agencies would prefer to spread out payments in annual installments instead of spending large amounts of capital at early stages of the life of a school facility.

The Board of Education for New York City, serving one million students, has demonstrated successful experience in leasing accommodation for elementary school children in former churches, synagogues, catering halls, arenas and theatres. Because of the fiscal crisis in New York, a severe financial stress has been added to the rapid changes attending pupil population shift and declining enrolment. Thus, the N.Y.C. Division of School Buildings has been under extreme pressure to solve complex school building problems economically. Leasing has proven to be one good solution. Based on experience, the School Buildings Division now prefers short-term leases with cancellation clauses. Cost-effective calculations for renovations are based on five year occupancy of leased space.

Variations on Leasing

Leasing can be used to advantage in a variety of situations. Some of these situations were dealt with earlier in this report, for example:

- transportable units for classrooms and other functional areas can be leased from suppliers,
- demountable schools can be leased from manufacturers and can also be installed on leased land,
- existing buildings, built originally for other purposes can be leased by school boards,
- space no longer needed by school boards can be leased to other public agencies, or to commercial enterprises,
- when facilities are shared between school boards and other public or private groups, the indoor and/or outdoor spaces (including air-rights) can be owned by one group and leased by the other(s).

Clearly, there are a number of variations of the above examples that could be applied to individual situations. Combinations of leasing and owning might be attractive to school boards that are faced with certain patterns of enrolment forecasts. In some cases, a desirable location, or an opportunity for shared use might be lost if leasing is rejected. In other cases, particularly in remote, isolated areas, the only practicable way of acquiring needed space might be through sharing facilities with others through some leasing arrangement.

Leasing can also be applied to situations where buildings are tailor-made to user's requirements. Such buildings can be built on the owner's land or on land owned by a developer and leased to the school board. In these situations, the developer designs and constructs the building in accordance with the owner's specific requirements and leases the building to the owner at an agreed upon annual amount for a specified period of time. Sometimes these arrangements include an option to purchase for a specified amount at the end of the lease period. The principal advantages of such arrangements to the school board are:

i) the acquisition of a tailor-made facility;

ii) lower initial cash outlay, and

iii) ease in disposing of the facility if desired at predetermined periods in time. Needless to say, the more easily the facility can be converted to other uses, the more valuable it is to the developer when the school ceases to occupy the facility. Thus, a more flexible building would result in more favourable terms to the school board.

During our interviews we encountered many school boards that leased space for their own use on either a short or long-term basis or who leased surplus space to other organizations. The Toronto Board of Education has developed a list of building characteristics to be considered when leasing space. They are:

- Does the building (or can it be made to) comply with fire code regulations?
- Does the building have adequate stairways?
- Does the building have sufficient washroom facilities?
- Are there good acoustics?
- Are the floors strong enough to take the loading required for a library?
- Are environmental central facilities (air conditioning, heating) adequate?
- Can the classrooms be built to have high ceilings?
- Is there sufficient parking space?

The above criteria are obvious especially when considering the specifications of a new school. However, since a school has more stringent requirements, the question is: can a building be converted to school use? In Toronto, the belief is that a lease should be for at least ten years to justify the conversion costs for a building.

In Manitoba, space is leased occasionally but mostly for administrative use. In Prince Edward Island, a building which had once been a private school was leased from the City of Charlottetown and used as an elementary school while a school was being built. Similarly, in Prince Edward Island, space was leased in private homes for two years for elementary classrooms while a school which had burnt down was being built.

In Toronto, both the public and separate school boards are considering leasing land from the city (on a 99 year base) on which a joint educational facility will be built.

We have already made reference to the fact that in many cases the separate school boards lease surplus space from the public school boards. In Etobicoke, surplus classroom space has been leased to the juvenile court, day care organizations, nursery schools and art schools. The terms of the lease are for five years with the lessor responsible for any alterations. The lease has to be designed to protect the students at the school and, for this reason, only organizations that blend well with a school environment are even considered. The fire marshall's regulations are strict and cooking and smoking are prohibited or are permitted under severe regulations. The location of the tenant cannot restrict the entry or exit of the students.

The Peel Board of Education has an organized committee for the purpose of finding and screening uses for surplus space, including the location of potential tenants. Other school boards such as Toronto and Scarborough are considering action such as this when they have surplus space in one area and require space in others.

Summary

School boards can take advantage of leasing in two ways:

i) space can be leased by the school board in a building owned by another organization, or

ii) space in a building owned by the school board can be leased to other organizations.

In both cases, there are opportunities for closer contact between the school and the community. When compared with building and owning, the principal advantages to the school board of leasing space from others are as follows:

(a) Initial capital outlays are lower.

(b) Opportunities may exist for a better location for the school.

(c) Facilities are more readily disposed of.

(d) Leased space can be more responsive than permanent facilities to declining enrolments.

(e) Total costs of accommodation can be less under certain circumstances and for certain time periods.

(f) Needed space can sometimes be made available more quickly.

(g) Leasing could be the best way of ensuring community involvement.

The disadvantages to the school board of leasing space from others are as follows:

(a) Space may not be entirely suitable for the purposes required.

(b) The school board would not own land in specific areas in a time of need.

(c) The school might have to evacuate the space at a time when it is inconvenient to do so.

(d) Total costs for accommodation could exceed those for building and owning under certain circumstances and for certain time periods.

(e) Review and approval procedures would have to be modified.

(f) Funding methods would have to be designed to allow a true comparison between leasing and other alternatives based on the total costs of providing facilities.

(g) Actual enrolments and actual costs might be substantially different from the forecasts used in the initial comparison.

The principal advantages to school boards of leasing space to other organizations (either public or private) are as follows:

(a) This sharing of space enhances the opportunities for community involvement.

(b) Rental income is a source of revenue to offset underutilized facilities.

The principal disadvantages of leasing space to others are as follows:

(a) Financial arrangements are more complicated.

(b) Administration time and costs would increase.

Conclusion

The funding methods, as well as the planning procedures for review and approval by provincial authorities, should be designed to encourage school boards to consider leasing space (as either landlord or tenant) in all situations where leasing is appropriate. If space for lease is available or can be made available, school boards should be requested to compare this option with other methods of acquiring facilities. Comparisons should include such matters as functional adequacy of the space, the degree of community involvement, overall capital and operating costs (for appropriate time periods), and should be based on the best present forecasts of pupil enrolment as far into the future as possible.

Similarly, school boards should be requested to investigate the possibility of leasing underutilized space that they own to other organizations.

Proposals by school boards to accept or reject the leasing of space from others, or the leasing of space to others, are submitted to Alberta Education. accompanied by the comparisons and investigations that support such proposals.

In no case should the concept of leasing be rejected out of hand.

C. SELECTING THE BEST OPTION

In order to take advantage of the full range of these options, school boards should first develop the best present forecast of future pupil enrolment at the school in question over a reasonably long period of time - say 25 to 30 years. Permanent building structures last longer than this, and many of the costly elements and systems incorporated in most buildings (e.g. heating, ventilating, air conditioning, lighting, power, windows, doors, partitions, roofing, flashing, etc.) have life spans approaching this age. It is, therefore, appropriate to verify long-term needs before applying long-term solutions. It is unlikely that the long-term forecasts of enrolment at one school can be isolated from those of schools nearby. Shifts in population, declining enrolment and other factors might lead to the closing of certain schools and the possible expansion of others at various points in time. Thus, a realistic forecast of the future of one school should be made in the context of a plan that encompasses a number of schools in a district or region.

Each option should be examined each time space is needed, with one selected and all others rejected with reasons.

1. A MULTI-SCHOOL PLAN

A master plan for the distribution of schools within a district or region should pinpoint the schools that are most likely to remain as permanent facilities and those that could be closed down if and when enrolments decline.

One way of developing a plan is to begin by considering the following two factors:

- the maximum distance that pupils should travel from home to school, and
- the optimal size of a school.

Current guidelines suggest that for urban elementary schools (K-6) the walking distance should be less than 3/4 of a mile, and the optimal size should lie between 210 and 500 pupils. Under ideal circumstances, elementary schools would be spaced to satisfy the distance guidelines, thus, each school would serve a gross area of approximately 1.5 square miles (allowing for some overlapping). If each of these schools were to contain enrolments between 210 and 500 students, the density of elementary pupils in each school area would be approximately 140 to 330 pupils per square mile, or .22 to .51 pupils per acre. These densities are low when compared with new communities containing say, 7.5 to 9 dwellings per acre, but are high for rural areas and for urban areas that house middle aged, elderly, unmarried and childless people.

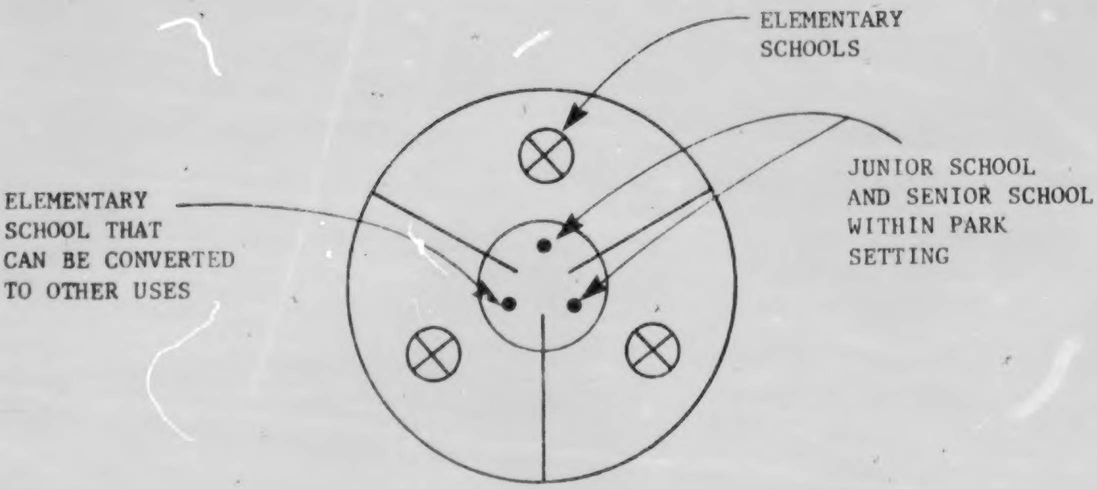
When the density of elementary school children exceeds .51 pupils per acre, schools must be spaced closer together or must exceed the desirable maximum size, or both. If permanent type facilities are built for these high density situations, the school board is left with an inventory of fragmented, underutilized space in times of declining enrolment. One solution to the above problem is to earmark certain locations for long-term school sites. Such locations should be spaced to provide a maximum distance of 3/4 of a mile from home to school in an urban setting and could contain permanent core facilities that would be expanded as the need arises using transportable units. Other locations would be less permanent in nature, having sites and buildings that could be disposed of when enrolments decline - the remaining students being transferred to the long-term school. Transportable, demountable or disposable buildings could be considered for these less permanent locations, and leasing is another alternative. At the least, permanent buildings should be flexible enough for sale to others.

When the density of numbers of elementary school children is less than .22 pupils per acre in an urban situation, travel distances must be extended, or schools must be less than the desirable minimum size, or both. In such situations, the distribution of schools should be based on a comparison of operating underutilized facilities with providing pupil transportation to schools of more optimal size. If the results of the comparison favour undersized schools, the school board should consider sharing space and costs with other organizations. Leasing should also be considered.

Clearly, it is not possible to develop any one multi-school plan that is suitable for all situations. Each school district should develop its own plan that reflects its unique characteristics. The special nature of the local topography, access routes, public transportation, climatic conditions as well as the present and future density, age level and income level of the population should all be taken into consideration. Plans should be developed for each school category including elementary schools, junior high schools and high schools. These plans should be coordinated to allow schools for different age levels to be sited side by side and, wherever possible, grouped with community facilities to provide a focus for community activity. Full use should be made of the knowledge and cooperation of planning

EXHIBIT F

LONG RANGE MULTI SCHOOL PLANNING IN PEEL COUNTY ONTARIO



ELEMENTARY SCHOOLS
JUNIOR SCHOOL AND SENIOR SCHOOL WITHIN PARK SETTING
ELEMENTARY SCHOOL THAT CAN BE CONVERTED TO OTHER USES

authorities, community groups, and others involved in the future development of the district.

A recent example of long range multi-school planning in a developing area is taking place in Peel County, Ontario. There, the school board has decided on the following number of schools per 25,000 population.

1 Secondary School (9-13) with 1,000 students
1 Senior Elementary School (6-8) with 700 students
3 Junior Schools (K-5) with 525 students each

The schools are located within a circle with a Y in formation in Exhibit F opposite. Each X in the outer circle represents a junior school. Within the inner circle are the senior elementary and secondary schools and a further junior school. These schools are all built for close proximity to one another within a park land owned by the parks and recreation department. The junior school is planned in conjunction with the parks and recreation department so that when it is no longer needed it can be sold to the Parks and Recreation department. Their input into the design of the school means that it is compatible with their future use and can be easily converted into a community centre within the park environment. When the school is closed, the other elementary schools can take up any surplus students and their geographic service area is then the area in the completed triangle.

This method allows for prior planning for the closing of the school with its being purchased by a buyer who has had input into the design. It also means that students can be relocated to other schools with a minimum of disruption and without dramatically changing school

EXHIBIT G

CHECKLIST TO SELECT THE BEST OPTION FOR PROVIDING FACILITIES FOR AN INDIVIDUAL SCHOOL

ACCOMMODATION OPTIONS

SITUATIONS	CONSTRUCT PERMANENT NEW FACILITIES	CONSTRUCT CARE SCHOOL (INCLUDING TRANSPORTABLES)	CONSTRUCT DEMOUNTABLE, RELOCATABLE OR DISPOSABLE SCHOOL	RENOVATE EXISTING BUILDING ORIGINALLY BUILT FOR SOME OTHER PURPOSE	RENOVATE OR ADD TO EXISTING SCHOOL BUILDING	SHARING FACILITY WITH PRIVATE ENTERPRISE	SHARING FACILITY WITH OTHER ORGANIZATIONS	LEASING SPACE FROM OTHERS	LEASING SPACE TO OTHERS	COMMENTS
ENROLMENT										
static	x			x	x					sharing - optional
growing, with no evidence of future decline	x			x	x					sharing - optional
permanent need for core facility with evidence of future variations up and down		x		(x)	(x)	x	x			(x) using transportables
no need for facility in long term		(x)	x	(x)	(x)	x	x	x		(x) designed and located for future sale to others
enrolment at existing school declining						x	x		x	or sell school building
sparse, evident in isolated area		x			x	x	x	x	x	
AVAILABILITY OF FACILITIES										
desirable site available	x	x	x							
desirable site not available				x	x	x	x	x		
appropriate rental space available or could be built at reasonable rental rate								x		
suitable existing school buildings available				x						
suitable other building available					x					
AVAILABILITY OF FUNDS										
immediate funds in short supply						x	x	x		
funds available but must be applied to most economic option	x	x	x	x	x	x	x	x	x	
ENVIRONMENT FOR DESIGN/BUILD FORCES										
competitive environment for general contractors	x	x	x	x	x					favours traditional approach
competitive environment for subcontractors where time is short	x	x	x	x	x					favours construction arrangement approach
sophisticated development industry in a competitive environment	x	x	x	x	x	(x)		(x)		favours developer proposal approach (x) leaseback and other arrangements are possible
innovative approaches required on a multi-school basis	x	x	x	x	x					favours a "systems" approach
USES OF FACILITY										
school only	x	x	x	x	x			x		
shared community use	x	x	x	x	x	x	x	x	x	
CONTROL										
the need for maximum control of planning/funding process	x	x	x	(x)	(x)					favours the traditional approach or project management (x) alterations and renovations are more difficult to budget

boundaries. Similarly, the community has known from the beginning that the school would be closed eventually and that the site would be put to community use.

The Peel example is one of a number of approaches that can be taken towards multi-school planning.

Other plans might be more suitable in built-up areas, where the closing of some schools and the renovation of others are more compelling considerations. A multi-school plan, whatever its nature, is a vital step in the planning process. Without this plan it is difficult for the school board and the provincial approval and fund granting authorities to investigate options for individual school facilities.

2. THE BEST OPTIONS FOR INDIVIDUAL SCHOOLS

A number of factors are involved in selecting the best option for providing facilities for an individual school. Exhibit G opposite illustrates the options that should be given special consideration in various typical situations related to enrolment, availability of facilities, availability of funds, the environment for design/build forces, and uses that might be made of the facility. The list shown in the Exhibit represents only some examples of the many situations that could be encountered by a school board when investigating the various options for the provision of facilities for individual schools. Clearly, the list could be expanded to include many other factors that are unique to individual schools.

Once the school board has a thorough understanding of all the factors that influence the selection of the best option for an individual school, it should develop the most promising options to the point where they can be compared on a systematic basis. Comparisons should be based on the following considerations:

- conformity with the multi-school plans,
- responsiveness to anticipated changes in enrolment, including the possibilities for shared use of potentially underutilized facilities, the removal of facilities and/or the disposal of site and facilities where appropriate,
- functional adequacy, including the ability to satisfy curriculum requirements, the responsiveness to changing educational methods as well as the day-to-day demands for spaces of varying shapes and sizes,
- physical adequacy, including fire safety, the provision of pleasing surroundings, suitability of environmental conditions, and resistance to physical deterioration and obsolescence during the life span of the facility,
- suitability of location and access,
- ability to satisfy the specified requirements for community involvement, with minimal inconvenience to school operations,
- availability of needed outdoor spaces, or sports, recreation, parking, etc.,
- overall cost of providing the facility based on appropriate time periods, (with due consideration to the present net value of capital costs, building operating costs, renovation costs, leasing costs, residual value of permanent facilities and the value of relocated elements); and the ability to match cash needs with cash resources during the life span of the facility,
- ease with which the school board and the provincial education authorities can manage, control and fund the project at all stages of planning development and occupancy,
- all other factors that bear on the selection of the best option.

The confidence that can be placed in the selection of the best option is directly related to the effort made in developing:

i) the multi-use plan,

ii) the most promising options for individual schools,

iii) the enrolment forecasts, functional and physical requirements, community uses and other factors that govern the selection.

The time, effort and expertise that are brought to bear on these early activities are vital to the provision of facilities that will produce the most suitable space of the desired quality in the appropriate quantities at the right time and place.

D. THE PLANNING PROCESS

Established planning procedures, and the reasons for them, have a profound influence on the ability to select from all of the options that might be available for providing school facilities.

Most provincial fund granting jurisdictions have established procedures that are organized on an individual project basis. In Canada the planning procedures adhere to the following general pattern.

1.a) The school board prepares a "Building Proposal" or "Statement of Building Needs" identifying enrolment forecast by grade (five year projection), type of program, number and type of rooms (and their square footage), estimated capital cost and method of funding. Estimates of anticipated financial assistance, based on established formulae for provincial capital grants, are also included.

b) The Building Proposal is submitted to provincial education authorities for approval.

c) Once the Proposal is approved or adjusted:

2.a) The school board obtains a site and hires an architect who prepares sketch plans and cost estimates. Actual areas are measured from the sketch plans for a revised calculation of provincial capital grants.

b) The architect's sketch plans, cost estimates and grant calculations are submitted to provincial education authorities.

c) *Sketch drawings are also sent to provincial authorities on energy, environment, health, fire and finance for their approval.

d) Once the sketch plans and funding methods are approved or modified by agreement:

3.a) The architect prepares working drawings and specifications for the school building. Actual areas are again measured from these more detailed drawings, and revised estimates of capital costs and potential provincial grants are prepared.

b) *The above documents are submitted to provincial education authorities for their approval.

c) *Copies of the documents are also sent to provincial authorities on energy, environment, health, fire and finance for their approval.

d) Once approvals have been granted or documents have been modified by agreement:

4.a) Contract documents are issued to general contractors who submit lump sum tenders for the construction work.

b) The results of the tendering procedure are sent to provincial education authorities for their approval to proceed with the signing of a contract.

c) The contract is signed and the contractor builds the building in accordance with the contract documents under the overall supervision of the architect.

d) *Provincial education authorities are involved in the approval of substantial changes to the contract that might occur during the process of construction.

e) *Provincial education authorities approve the final acceptance of the project and approve the corrective action required under maintenance inspection prior to expiration of the guarantee.

Clearly, the above procedures were designed to be used for new permanent buildings that were planned, designed and built under the traditional approach. Most jurisdictions have adapted the procedures to encompass the renovations of and additions to existing schools, and in most provinces there are now procedures that relate to the installation and removal of transportable classroom units. A number of jurisdictions have added provisions that allow school boards to consider vacating a school and selling a building and site in accordance with regulated procedures. School boards are also permitted to rent or lease unused or underutilized spaces at nominal or market prices.

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* Alberta has streamlined its procedures to eliminate these steps.

The established procedures are not conducive to construction management, project management, bid-design proposals or systems building where the traditional step-by-step process must be short cut or abandoned. Nor do the procedures lend themselves to the leasing of space from other organizations. Difficulties are also encountered when shared use requires the involvement of a number of government departments in the planning, designing, construction and funding of a facility. These difficulties are aggravated when private enterprise becomes deeply involved.

The most stifling effect of the established planning procedures is the emphasis it places on the individual school projects, and the short-term nature of the forecast of needs. The procedure encourages school boards to isolate each project at as early a stage as possible, and to think only in terms of the first short period of the school's existence - a period normally associated with growth. In this environment, it is natural for a school board to become caught up in the excitement of producing a noteworthy building each time the opportunity arises. The system tends to constrain.

More emphasis should be placed on multi-school, multi-level, multi-departmental planning at an early stage, and this planning should look as far into the future as possible, as set out in detail in Section I of this report.

E. FACILITY DISPOSITION

The reasons why existing school buildings decline in usefulness or are candidates for abandonment are as follows:

(a) A general temporary or permanent decline in enrolment encompassing many schools in a given area.

(b) A temporary or permanent decline of enrolment in one school with increased demand for enrolment nearby.

(c) The school building shows signs of significant physical obsolescence by present standards of heating, ventilation, air-conditioning, lighting, fire exits, etc.

(d) Elements of the building such as roofing, flashing, masonry, windows, floor finishes, wall finishes, built-in furniture, equipment, etc. have badly deteriorated and are in need of substantial repair or replacement.

(e) The building is functionally obsolete in many respects (room sizes and shapes, equipment, built-in furniture, corridor widths, flexibility, constricted outdoor space, etc.).

(f) Developers want the property and are prepared to pay handsomely for it.

(g) Aging of neighbourhoods in which high housing prices preclude young family home ownership.

There are certain combinations of the above situations that make a strong case for abandoning existing facilities. For example, there might be a lack of enrolment combined with a building suffering from physical and functional obsolescence and deterioration, and a willing and well-endowed buyer. When such conditions exist there is a mechanism for schools (Alberta School Act) to dispose of facilities provided that there are adequate alternative facilities for the few students that remain.

(1) Surplus Space in the Wrong Location

School boards are now often faced with the problem of having surplus space in one area of the board's jurisdiction, while requiring space in another area - such as is now occurring in Edmonton and Calgary. This anomaly has been created by factors which were unforeseen twenty years ago. The first factor is declining birth rates. During the late 1940's and the 1950's and early 1960's, Canada, like the rest of the Western World, had a high birth rate. Planners in many areas expected that there would be an "echo effect" of the 1940's and early 50's baby boom when these children reached family formation ages in the late 1960's and 1970's. This did not occur because of a variety of reasons, including a new attitude to family size and planning and because of a greater participation of women in the labour force. So, while the absolute number of babies born each year has not declined, the number of children per household has. This means that there are fewer school age children in a community, while the schools in that community were built to serve a larger student population from that area. The resulting impact of this is that there is surplus space within a number of schools.

Meanwhile, communities are spreading out further from the city core and because earlier school design did not permit facilities to be relocated as population and demand shifted, there is a need for new facilities. This problem has been partly overcome in recent years by using transportable or relocatable classroom units.

The decline in the enrolment of any school and the subsequent surplus space is not a sudden event but rather a gradual process.

Initially, it can be viewed by many school boards as a blessing to reduce over-crowding and to provide space for programs which have long been put off because of a space shortage.

Classrooms which have become vacant can be put to a wide variety of uses; for example, vacant classrooms have been put to the following uses in Canada and the United States:

- Libraries
- Art and Music Rooms
- Reading Rooms
- Mathematics and Science Labs
- Pupil Services: Guidance
  Health

Surplus space has also been put to good use to provide learning programs which were not offered previously, such as programs for slow learning students or gifted students.

Many school boards have found that by providing surplus space for programs benefiting the community, they have helped to eliminate complaints against wasted space. Such programs could be day-care centres or nursery schools. School surplus space has also been used for municipal administrative purposes. For example, the school board in Metropolitan Toronto left out space for a Juvenile Court.

One school board in the United States has taken advantage of a drop in enrolment to develop the tri-level of schools, elementary, junior and senior, by reclassifying schools and shifting student population to the various schools.

Lower enrolments and surplus space have permitted many school boards to lower their teacher/pupil ratios. In Scarborough, Ontario they have lowered teacher/pupil ratios at elementary schools from 35 students per teacher to 28 students per teacher, using up most of the 200 "surplus" classrooms in that school board.

However, despite the addition of new programs, lower teacher/pupil ratios and community programs, it has become evident to many school boards that some schools must be closed. At this point, the school board must decide whether to close the school permanently or temporarily.

Experience within many school boards has indicated that the community should become involved in any decision with respect to school closing as soon as the school board realizes that this action must be taken. Within the Peel Board of Education, near Toronto, they are getting the community involved as early as five years before a contemplated school closing. This is in contrast to other school boards that have announced in June that a school will not be reopening the following September and then had to spend a large amount of energy calming an irate parent organization.

A standing community committee made up of school, public and community officials can be very beneficial in many ways. First of all, when surplus space begins to develop, this committee can review the school's space needs and, if the classroom space is not required, the committee can let it be known that the space is available and then screen and select the group which will be permitted to use the space. If the parks and recreation department has a member on the committee, they are often aware of community groups which require space and can direct their application to the committee for review. This committee can also serve as a multi-disciplinary team to help develop and recommend guidelines for closing a school. If such guidelines are available and applied, then it becomes much more obvious to everyone when a school should be closed and much of the adverse reaction from parents is eliminated.

One school board in Ontario has such a standing committee, and has likewise developed guidelines for when to close an elementary, junior or senior school. The committee considers aspects such as the following when considering closing a school:

1. The educational experiences of the students in the school.
2. An outline of the social influence of the school in the community.
3. Study of enrolment and population statistics and any future development plans for the community the school serves.
4. An estimate of the space used in the school for academic and non-academic purposes as well as an estimate of the state of repair of the building and, based upon the building's characteristics, possible uses for the building.
5. An estimate of the cost of operation of the building on a per pupil basis.
6. An estimate of the financial and logistical constraints on the school board.

The committee has also developed specific guidelines, to apply to closing elementary, junior or senior schools. When a school falls below a given number of classes or below a given number of students, the school will be closed provided that:

- there is a school within a given distance that the students can be transferred to and that their schools would not exceed their own capacities or level of effective capacities, and
- there is no likelihood for a significant student enrolment over the next five years which would affect any other schools.

As mentioned earlier, when a school is to be closed the decision has to be made whether this should be done on a permanent or temporary basis. It may be logical to "mothball" a school if there is potential for future growth or if the school is recent or of such a design then it may be financially prohibitive to replace it at a future date. The two main problems with this approach are:

- there is still a cost to keep the school and to guard it against vandalism, and
- parents in the community whose children must travel or walk to another school may try to bring pressure on having the school made available for their children.

Instead of "mothballing" a school it may be decided to put it to an alternative use for the mentally or physically handicapped or for an adult retraining centre or for regular students who could be transported from new subdivisions. The school could also be used for administrative space or as an alternate school while another school was being renovated. This would keep the student body together and provide a sense of continuity within the faculty and student body.

Many of the suggestions above are being applied by a variety of school boards in Canada and United States. Typically, there is no fee or only a nominal fee charged for the school's use, if it is used by a community non-profit organization. Fees are used to cover the operating expenses.

There have also been examples of schools which were thought to be required at a future date being temporarily leased or rented to commercial enterprises. In these cases, a rental rate, comparable to a commercial rate, would be applied.

Some school boards have also sold schools to commercial or other public organizations. There are, however, some problems which can be encountered here. A school should not be sold unless it can be stated with absolute certainty that it or the site will not be required again. The Toronto School Board will not sell a school site under any circumstances; they have, however, leased the buildings or torn down the buildings and leased the sites. Zoning restrictions often prohibit the use of the site by a number of commercial users and thus prevent a school board from disposing of the school. Also, schools may, because of design, be hard to sell. Many school boards have tried unsuccessfully to sell schools for several years because their size or selling price make them an unattractive purchase for commercial buyers.

Buyers for schools can be colleges, universities or hospitals or another school board such as the separate school board. If and when a school is sold, the sale should take place in public, either by means of a sealed bid or public auction. If the latter is used then the school should be sold to the highest bidder, although the school board can set a minimum figure and reject all bids below the minimum if it wishes to do so.

Many Departments of Education require that if a school is sold, any grant money that the school board receives for that particular school be returned to the province. In Ontario, an exception to the grant return is provided if the school was sold to another school board.

Ontario is also considering waiving the grant return requirement if the school is sold to a government agency. There is justification for this view although school boards may argue that they need the funds from a school to purchase sites or build schools in new areas. Despite this, many schools which are considered for closing are in areas where there may have been considerable appreciation in land and building values. This may present the school board with some capital gains despite the grant return.

Surplus space and school closings are part of the present day school administrator's problems. These problems developed because situations which had not been planned for occurred. Ideally, these school administrators will now plan schools in a rational manner looking at all the alternatives and developing strategies so that student places become more portable as the population shifts. Planning should also include the probability that some schools will have to be closed at later dates. These schools should be built on sites and so designed that this will happen as easily as possible.

The project library turned over to Alberta Education contains the comprehensive school closing procedure and legal requirements for New York City.

(2) Obsolete Facilities

One of the advantages of declining enrolments and surplus space is that it provides the schools with an opportunity to get rid of obsolete facilities. Obsolete facilities will occur when the renovation costs of updating an older school exceed a certain percentage of new school construction. This percentage figure can vary. One American study set the level at 50% of new construction costs while guidelines established in one Ontario paper were 60 to 70% of new construction costs.

When a school is judged by the school board to be obsolete, the decisions facing the school board are similar to the decisions of building a new school. Consideration has to be given to the demand for facilities on that site to determine if a new school should be built on that location or whether the students should be transferred to an adjacent school(s) and the site disposed of entirely.

If there is surplus space within the board, hopefully it can be the obsolete space which is closed; just past this point, the analysis for this space must be the same as that applied to new facilities.

SECTION IV

SCHOOL FACILITY FUNDING ALTERNATIVES

IV. SCHOOL FACILITY FUNDING ALTERNATIVES

A. INTRODUCTION

We believe that the major deficiencies in the existing system for providing school facilities are in the planning process. While the effectiveness of a planning system can be enhanced by the funding mechanism used, we do not believe that the existing funding mechanism is a major factor contributing to the present planning deficiencies. However, the principle of continued local participation in the development of new schools suggests that greater involvement by local boards in fiscal and placement responsibility is desirable.

We have considered a range of possible alternatives for changing the capital funding mechanism. An outline of the analysis process for evaluating the many possibilities is provided in Appendix X. Those alternatives which appear to be most promising from the Alberta point of view are presented in subsection D following a discussion in the next two subsections of the present practices followed in Alberta and in other jurisdictions and our understanding of the particular problem areas currently being faced in Alberta.

B. SURVEY OF PRESENT PRACTICES

This sub-section summarizes the way school construction is currently being funded in Alberta and in other provinces in Canada. The prevailing practices in the United States, the United Kingdom and Australia are also discussed briefly.

TABLE 8b

SCHOOL BUILDINGS

DEBENTURE DEBT

1966 - 1975

($000's)

Year	Amount Debentures Issued	Supported*	Ineligible Amount	Supported Percentage
1976	$43,863	$38,004	$ 5,859	86.6%
1975	22,887	18,820	4,067	82.2
1974	15,306	13,348	1,958	87.2
1973	11,213	9,218	1,995	82.2
1972	18,076	16,747	1,329	92.6
1971	30,760	28,471	2,289	92.6
1970	42,686	-33,794	8,892	79.2
1969	55,094	47,506	7,588	86.2
1968	53,545	42,648	10,260	79.6
1967	45,973	35,713	10,260	77.7
1966	39,321	32,504	6,817	82.7

* By Province through annual grants within the School Foundation Program Fund sufficient to meet principal and interest payment obligations by the local boards.

Note

The figures in this table relate to the cost of school buildings only. They do not include the costs for land, equipment or other capital items.

The years 1974, 1975 and 1976 are subject to minor revisions as projects are completed and analyzed.

1. Capital Funding in Alberta

Capital funding in Alberta is related currently to the "approved" portion of school facility construction. Determination of "approved" costs is a responsibility of the School Buildings Board of Alberta Education. The Executive Council has set out the School Buildings Regulation, in which there are definitions and guidelines regarding the specific size and purpose for all areas within a proposed facility. Instructional areas and the amount of non-instructional space is regulated. Standard square footage construction cost allowances plus distance allowances are applied to the approved space to establish the capital cost level eligible for provincial support. When a school board has costs above those supported for approved areas the amount of additional costs can be included in the debenture purchased by AMFC. Although that portion of the debenture is not offset by grants, the interest in excess of eight percent present is subsidized by the province. Where a school board provides space beyond that eligible for provincial support, the school board must pay for the additional cost - usually from funds collected under supplementary requisitions against the local property assessment.

Almost all new school space added in Alberta in recent years has been financed through the issue of debentures. Table 8b opposite shows the amount of debentures issued over the past ten years and the extent to which these have been supported by the Province. Briefly, the steps followed to finance school construction through the debenturing process are:

1. The local board obtains approval for the construction project and the eligible support level from the School Buildings Board according to the space and rate standards then in force.
2. The board tenders the construction and submits the successful tender together with the signed contract to the Minister of Education for approval.
3. In order to borrow to pay for the contract, the board, under authority of The School Act, must pass a by-law in a form approved by the Local Authorities Board. (The Local Authorities Board is the provincial watchdog over a municipality's or school district's ability to finance; in the case of school construction the focus is primarily on the board's own ability to repay the amount of the unsupported cost portion).
4. When approval has been obtained for the borrowing from the Local Authorities Board, and all other legal requirements are met, the Field Services Branch prepares the necessary debentures for the lesser of the total amount approved or the cost of eligible construction. These are sold to the Alberta Municipal Finance Corporation and the proceeds forwarded to the local board as follows:
    - up to 50% of the contract amount immediately,
    - up to 75% of the contract amount when construction is ruled to be 75% complete,
    - the balance when final costs have been issued to the School Buildings Board and a statement of eligibility prepared.

5. For each project the School Buildings Board notifies the Field Services Branch of the portion eligible for provincial support.

6. The local board submits an annual claim to the Finance, Statistics and Legislation Branch for that portion of its debenture repayments eligible for provincial support. These claims are repaid in instalments throughout the year - a larger portion being paid in April, with smaller regular amounts monthly from May to December.

   (Note: In the fiscal year ending March 1977, the SFPF will be financed through general provincial tax revenues in the amount of about $417 million plus a 26 mill mandatory levy on the equalized assessment of all non-residential property throughout the Province to yield a further $58 million for a total of approximately $475 million.)

7. The local board repays the Alberta Municipal Finance Corporation directly according to the repayment schedule specified for each debenture. The terms and interest rates on the debentures reflect over time the prevailing conditions in the bond markets. Repayment amounts are usually scheduled as equal annual instalments of principal over the term of the debenture plus annual interest on the outstanding principal.

On a province wide basis the total amount of debentures outstanding at the end of 1975 was approximately $328 million of which $41 million or 12% was the responsibility of the local boards. Servicing of the provincial share of the total debt currently costs the Province in the area of $40 million annually. Total provincial grants for ECS,

TABLE 9

ALBERTA EDUCATION

SURVEY OF FUNDING TECHNIQUES

	Provincial Share of APPROVED AREA FINANCING			Approved Area-Costs in Excess of Provincial Support		
		How is the provincial share paid?				
	How much does the province pay?	At time of construction	By funding of debentures	Are funding costs included in budgets provincial support?	Are special local levies required for payment?	Are excess area costs funded only by local special levies if debentures?
Alberta	90% of approved standard allowance per sq.ft. for elementary and high schools		Yes	No	Yes	Yes
British Columbia	50-90% of tender cost of approved area		Yes	No	Yes	Yes
Saskatchewan	20-40% of costs of approved project - also pays debt servicing in future years	20-40% of total at time of construction	Remaining cost to tendered amounts	Yes to average 80% support level	Yes for part not funded	N/A - not debentured
Manitoba	Support is 100% of approved cost of approved contract	N/A	Yes	N/A	N/A	N/A
Ontario	Based on accommodation Unit Factor - averages 75% of approved cost depending on district assessment	No	Yes	No	Yes	N/A
Quebec	Fixed allowance per sq.ft. based on budget for approved area and specifications	A portion	Remainder	No	Yes	N/A
Nova Scotia	Up to $30 per sq.ft.	Rarely	Yes	No	Yes	Yes
Newfoundland	90%	Yes				
New Brunswick and Prince Edward Island	100%					

elementary and secondary education in Alberta (including those under the SFPF and the Municipal contributions to the fund) will be about $558 million in 1976. Thus, it is apparent that the payment for capital costs (through the debenturing process) will account for less than 10% of the total provincial education budget in 1976/77.

2. Capital Funding in Other Canadian Provinces

The amount and basis of capital funding of schools varies from province to province and from country to country. Set out on Table 9 opposite is a summary of the level and method of funding of school construction in provinces throughout Canada.

The following brief observations can be made regarding the various funding methods used:

i) Provincial Proportions of Approved Construction Costs

The proportion of construction costs paid by provincial governments varies across Canada. New Brunswick, Prince Edward Island and Manitoba pay 100% of approved school construction costs. Like Alberta, Nova Scotia and Quebec pay a portion of construction costs on an allowance per square foot basis. The remaining provinces pay a percentage portion of the cost of approved area or cost. In British Columbia and Ontario the percentage paid varies depending on the local assessment level, thus levelling local disparities somewhat.

ii) Methods of Funding

The provincial share of construction costs is normally covered by a debenture issue, although Quebec and Saskatchewan do give a portion of their support by way of a grant as construction proceeds. Saskatchewan combines a capital grant formula with its operating formula for the funding of school construction. Under the capital program, 20%-40% of the approved costs of the building program are met by a grant at the time of the construction. The costs remaining after the grant are debentured. The debenture retirement and interest payments are included in operating expenses over future years with the province including in its operating support an amount to cover the debt financing to the same relationship that it covers other operating costs. In this manner, Saskatchewan funds, on average, 80% of all construction costs.

iii) Payment for Non-Supported Portion of Costs

Special local levies on property assessment are normally used to pay the non-provincially paid portion of construction costs or debenture funding.

iv) Payment for "Extras"

Areas in excess of approved space requirements, where allowed, normally have to be financed from current revenue or by grants from other community groups. Nova Scotia does allow supplementary area costs to be included in the total debenture issue with the repayment of that portion of the debt which relates to "extras" being the responsibility of the local government body.

v) Timing of Funding

Construction is normally financed by way of debt or future charges rather than by a building reserve fund which accumulates the necessary funds prior to construction. Payment for construction out of current revenues is allowed in most provinces depending on the size of the construction relative to current revenues, but is not commonly used.

3. Capital Funding in the United States

Most states operate grants programs for capital construction. These grants vary from small amounts to 100% of construction financing. The normal methods of financing the non-grant portion of the costs is by pay-as-you-go financing or bond issues. Pay-as-you-go financing is restricted to those localities where the tax base is sufficiently large to absorb the costs in one year. Bond issues are restricted by the amount of debt that legally can be supported by a locality and by approval of the electorate by vote. Over the past few years there has been a noticeable increase in the number of failures of bond issues due to a general lack of investor interest. Accordingly, the problems of financing of school construction has reached crisis proportions in certain localities in the United States.

4. Capital Funding in the United Kingdom and Australia

The practices followed in the United Kingdom and Australia are worthy of note because of the wide contrast they offer.

In the United Kingdom, capital funding is entirely the responsibility of local boards. The central government does not provide any specific grants for school construction, although non-specific equalization grants may be used for this purpose. Prior approval for construction spending in excess of specified limits is required from the central government, however.

In contrast, capital funding in Australia is the complete responsibility of the Commonwealth and the State governments. Grants are made annually to the State governments by the Commonwealth. The level of grant support in dollar terms is set each year in a States Grant (Capital Assistance) Act which is approved by the Senate and House of Representatives.

5. Conclusion Regarding Present Practices

Our review of existing school construction funding practices has emphasized that there is no single best method which is appropriate for universal application. The particular educational, social and economic environment in which each provincial or state jurisdiction finds itself must be considered carefully when recommending a funding mechanism best suited to its needs. Our survey does show there is a considerable range in the practices employed currently within Canada, the United States, the United Kingdom and Australia. However, within Canada itself, the funding basis used in Alberta, while differing in certain aspects, does not vary appreciably from the general practices followed in other provinces.

C. CURRENT ENVIRONMENT IN ALBERTA

The major factors which determine the most appropriate source for school construction funding may be classified broadly as economic, social, political and demographic. A brief outline of our comprehension of how these factors presently operate in Alberta in connection with school construction funding is useful to the reader's understanding of how the alternatives discussed in Subsection D were identified and developed.

1. Economic Factors

The rapid increase in public spending throughout all levels of government in Canada during the 1960's and early 1970's has, within the past several months, resulted in severe limitations on governments' abilities to raise the revenues required to finance this spending. As a result, most governments have recently devoted considerable effort to finding ways to reduce their spending growth rate. The Province of Alberta, due to its wealth of key natural resources, has been less severely constrained than other jurisdictions within Canada, but nevertheless, the Province has recognized that it too must seek ways to control future spending carefully in order to conserve its limited financial resources. With this in mind, there is concern that the provision of new school facilities throughout the Province is costing somewhat more than may be warranted by the need for such facilities.

2. Social Factors

Partly because Albertans have experienced relative prosperity in recent years, the residents of the Province have grown accustomed to a high level of public service from the provincial government and their expectations for future services remain high. Included among these high expectations for provincially financed public service is a general belief that new school facilities should maintain the existing high standards of quality now enjoyed despite the rapid escalation in construction costs in recent years. Even more important perhaps is the expectation of a majority of urban public school supporter parents that a school should be available to their children within short walking distance of their homes.

3. Political Factors

Because so many parents generally believe it is their right to have a school near their homes, they apply considerable pressure to their local school board for such a facility where none presently exists. Since school board officials are answerable to a local electorate, they tend quite naturally to be influenced strongly by such pressures for new or improved school facilities. Under the existing funding system, whereby the Province pays approximately 80 to 90% of school construction costs, it is not surprising that boards sometimes succumb to these pressures by petitioning Alberta Education for new facilities even where there may be a reasonable alternative to further school construction.

4. Demographic Factors

Within a stable population distribution by age group, the foregoing factors would not be expected to contribute to any significant over-building as the supply of school facilities would soon be in reasonable balance with the demand for such facilities. Such stability of population is not representative of Alberta today, however, where the population is both growing and shifting location at a fairly rapid pace. It is primarily the shift in population that is placing current pressure on many school boards for new facilities; even where projections of student numbers are actually declining. It should be noted that, due to the maturing of the post-war baby boom beyond the normal school age, projections of declining student enrolment are prevalent even in many school districts experiencing a growth in total population. This phenomenon is most pronounced in the two major urban centres of Edmonton and Calgary. As these two cities, and to a lesser extent the smaller urban centres, continue to grow, there is a continuous rapid increase in population in the new suburban areas and adjacent satellite towns. A large proportion of the growth of these areas is comprised of families with school age children. At the same time, older, more established areas in these urban centres are continuing to mature in terms of the average age of the residents and the student enrolments in these areas are undergoing significant declines.

The inevitable result of the shift of school age population from the city centres to the outlying areas is a shortage of school space in certain suburbs and a surplus of space in the city centre. To date, efforts by the urban school boards to transport students from the new residential areas to the existing older schools have been met with considerable parental resistance. These factors have contributed to the construction of new schools in almost every significant new urban residential development in recent years. Unfortunately, such additions to each city's total inventory of school space have not been offset by corresponding space reductions through consolidations of older, more central facilities and the disposition of unneeded space.

The situation is typified by recent requests from the Edmonton Public School Board for twelve to fifteen new schools in 1977 despite projections of a modest decline in the city's total enrolments over the next few years and considerable underutilization of many city schools.

5. Conclusion Regarding Environmental Factors

With the above factors in mind, a funding mechanism should be selected which will assist the planning process to alleviate the pressure for additional facilities in growth areas of the Province at a time when many existing facilities are underutilized.

D. SUGGESTED ALTERNATIVE FUNDING MECHANISMS

The funding mechanism alternatives presented in this subsection have been developed from our understanding of the specific situation now existing in Alberta and from our analysis of the considerable research and literature available on the subject of school funding and the experience of other jurisdictions. None is necessarily superior to the existing mechanism which, recent experience has shown, provides close to 90% provincial support for total school construction costs. The principal factors considered in developing these as appropriate alternatives to the present mechanism are:

i) That the tendency to overbuild new school facilities in Alberta is strongest in the developing suburban areas of Edmonton and Calgary.

ii) That both Edmonton and Calgary now have surplus space available but primarily in locations removed from the student populations.

iii) That certain alternatives should be presented which reinforce the need for adequate planning at the local level by shifting part of the financing burden back to the school districts requesting new facilities.

iv) That equity of educational opportunity should be preserved.

v) That school board autonomy should be maintained.

Unfortunately, certain of these principles are mutually exclusive so that it is not possible to identify or develop a single funding mechanism which addresses itself completely to each of them.

We felt it was appropriate, therefore, to present more than one possible mechanism for consideration. Accordingly this subsection outlines four possibilities which, in addition to the existing mechanism, would be most closely appropriate to Alberta's particular situation as it exists in 1976. Included at the end of our discussion of these four mechanisms is a fifth option that may be described as a utilization mechanism rather than a funding mechanism. Essentially, it is a control tool which we believe could be used beneficially with any of the four funding mechanisms described herein or with the existing funding mechanism.

Whereas each of the alternatives presents a different method for determining the provincial versus local share of the funding, all choices presume a continuation of the existing debenture process for financing. The payment for school facilities out of future funds secured through the debenture process is clearly the most popular method employed, at least throughout North America. The placing of the actual funding burden over a series of future years through debenture repayment obligations best matches the timing of the payment stream for new facilities against the useful life of the facilities. In effect, a portion of the financial burden of providing a new facility is deferred until the students who will benefit from that facility graduate from the school system and enter the ranks of the taxpayers. Thus, the cost of the facility is shared to some extent between parents and students through their future tax dollars.

Methods of funding other than through debentures were considered but were found to be less appropriate to Alberta's current situation. For example, the possible leasing of facilities should never be rejected out of hand, but, in Alberta's case, would rarely be appropriate since the major demand for new school space will likely continue to be in newly developed areas where there are few, if any, suitable existing buildings which could be efficiently leased and converted to satisfy even a temporary demand for additional school space.

Similarly, the possibility of requiring residential developers to provide schools at their own cost was rejected as these extra development costs must inevitably be added to the already high costs of housing in growth areas of the Province. The practice of levying school construction costs against developers has been followed quite extensively by a few municipalities in other jurisdictions. However, the general consensus of opinion resulting from various studies into this source of funding is that it is not a desirable practice. A fuller discussion of development levies is contained in Appendix X.

In summary, we recommend that the debenturing process for financing the capital cost of school construction should be continued, but the mechanism for determining the split between the provincial and local share for servicing the resulting debt obligations could be chosen from any of the four alternatives described hereunder.

We emphasize again that the major weakness to supplying school facilities in Alberta lies in the existing planning process. We do not believe that any of the four funding mechanism alternatives presented here are necessarily superior to the existing mechanism. However, we do believe that any of them can be supportive to the new planning process that we recommended earlier. Regardless of which direction Alberta Education chooses to follow with respect to future funding mechanisms, we urge that careful consideration be given to using the control mechanism presented at the end of this subsection in order to meet the major problems of overbuilding in districts where older schools remain underutilized.

The four new funding mechanism alternatives and the recommended utilization mechanism are:

Funding Mechanisms

1. Local school construction levy to a specified maximum mill rate.
2. Limit provincial funding to the reciprocal percentage which the local equalized assessment base bears to the total provincial assessment base.
3. Change the existing square footage support rates to reflect a district's ability to pay.
4. Shift full funding responsibility for the provision of school facilities to the Province.

Utilization Mechanism

1. Tie provincial support to the ratio of existing student spaces to enrolment projections.

Each of these five possibilities is discussed under the following headings:

a) Outline of the suggested mechanism,
b) Advantages and disadvantages, and
c) Examples of the results of the mechanism's application.

In providing examples we have assumed certain rates, percentages and other quantitative data in order to demonstrate the principles involved. The numbers selected should not be interpreted as recommendations of appropriate values. They may be adjusted readily if it is felt that the results do not represent the most equitable local/

provincial cost sharing arrangement. For illustrative purposes, we have applied each mechanism to three representative school districts as follows:

i) A major urban district (Edmonton Public School District #7).

ii) A small urban district (Medicine Hat District #76).

iii) A rural district (St. Paul County #19).

1. Local School Construction Levy to a Specified Maximum Mill Rate

a) Outline of the Suggested Mechanism

Each school district would be required to finance the annual cost of its own new schools to a specified maximum mill rate applied to its equalized property assessment value. Any deficiency in meeting the approved construction costs would be made up by the Province. This mechanism is an adaptation of the Strayer-Haig-Mort model (which is recognized widely in recent research into educational financing) applied to construction costs only. The levy should be identified clearly as a "school construction levy" in order to differentiate it from the existing 26 mill non-residential levy which helps finance the School Foundation Program Fund. Costs over and above the approved construction cost level would continue to be provided from an optional local assessment.

In order that local school boards will be most responsive to the costs of their proposed building programs, which are often demanded by their district residents, the school construction levy should be applied to both residential and non-residential property. The actual mill rate to be levied for school construction in any one year would, subject to the specified maximum, depend upon the tax yield of the district relative to the construction costs to be incurred. The maximum levy could be set based upon total province-wide school construction cost projections and the desired overall level of capital financing participation of the Province. The existing debenture process of financing should be continued with the provincial share of debt service costs being computed on the deficiency of the local school construction levy tax yield (as compared to the approved construction costs) for those districts levying the maximum specified mill rate.

b) Advantages and Disadvantages

The principal advantages to such a capital funding mechanism are:

i) It Shifts the Financing Burden More Toward the Local Boards

Depending upon the maximum mill rate specified for the school construction levy, a greater proportion of the capital financing responsibility is shifted to the local district. This should offer additional encouragement to local board officials to ensure that the recommended planning process is carried out carefully and completely so as to incur only those construction costs as are absolutely necessary to serve adequately the student population of their districts.

ii) It Maintains a Certain Degree of Equity in the Financing

Providing a fair maximum levy rate is established, reasonable equity among districts is assured. The major urban district having a large assessment base and a modest planned building program would completely or substantially finance its own required school construction. However, if student population growth demanded a more ambitious building program (which would otherwise place a significant charge on the local ratepayers), the maximum levy rate would be reached and a larger proportion of provincial funding would be forthcoming.

Conversely, a smaller, poorer district with a low assessment base could expect a high proportion of provincial assistance even for a modest construction program as its maximum levy would yield relatively few tax dollars.

iii) The Provincial Share Can Be Readily Adjusted to Meet Changing Circumstances

Depending upon the aggregated picture painted by the local boards in their school building plans each year, the Province could readily adjust its participation in the funding by increasing or decreasing the maximum mill rate specified for the school construction levy. In order not to disrupt the planning process of each board, however, it is suggested that any proposed change in the established maximum mill rate be announced at least one full year before it would take effect.

Two disadvantages to this funding mechanism are:

i) It Encourages a Board to Bunch Its Construction Projects

By linking planned capital construction expenditures to a maximum annual school construction levy, it would be advantageous for a school board to bunch its expenditures into a single year wherever possible. In this way it can qualify for a greater proportion of provincial support by causing its construction costs to exceed its maximum local revenues in the year in question with the Province funding the excess. This bunching approach would be preferable, in the board's view, to financing a higher proportion of those same construction costs through two or more consecutive annual levies.

It is possible to overcome this objection by requiring a board to fund its share of the school construction costs over more than one year's levy. For instance, a five year period might be stipulated as being a reasonable time period on which a board should plan its construction needs. Whatever the time period selected, the principle of requiring a board to pay for its share of the costs over a series of future years' school construction levies is more compatible with the actual cash flow required under the board's debenture servicing obligations.

TABLE 10

FUNDING MECHANISM ALTERNATIVE #1

LOCAL SCHOOL CONSTRUCTION LEVY TO A MAXIMUM MILL RATE
(in $ thousands)

	Large Urban Edmonton District #7	Small Urban Medicine Hat District #76	Rural St. Paul County #19
1974 EQUALIZED ASSESSMENT VALUE	$ 1,152,607	$ 51,221	$ 8,566
MAXIMUM MILL RATE OF 5			
Build one school			
Local share	1,500	256	43
Provincial share	-	1,244	1,457
Total construction cost	1,500	1,500	1,500
Build five schools			
Local share	5,763	256	
Provincial share	1,737	7,244	N/A
Total construction cost	7,500	7,500	
Build ten schools			
Local share	5,763		
Provincial share	9,237	N/A	N/A
Total construction cost	15,000		
MAXIMUM MILL RATE OF 10			
Build one school			
Local share	1,500	512	86
Provincial share	-	988	1,414
Total construction cost	1,500	1,500	1,500
Build five schools			
Local share	7,500	512	
Provincial share	-	6,988	N/A
Total construction cost	7,500	7,500	
Build ten schools			
Local share	11,526		
Provincial share	3,474	N/A	N/A
Total construction cost	15,000		

ii) It Shifts Financial Emphasis to the More Regressive Property Tax

Notwithstanding that this mechanism preserves a fair degree of tax equity as described under advantage (ii), it does shift a proportion of the funding source away from the general provincial revenues, which are largely resource or income based, to a tax based on assessed property values. In that taxes on property are generally held to be regressive, this method effectively goes against the thinking of most modern taxation theorists and Canadian public opinion by substituting regressive property tax revenues for more progressive tax sources.

c) Examples of the Results of Applying this Method of Capital Funding

Table 10 opposite shows the results of applying this method to three typical districts in Alberta at the assumed maximum school construction levy rate specified. The equalized assessment values shown for each of the three illustrated school districts were taken from the 1974 fiscal year Financial and Statistical Report of Alberta School Boards. The average "approved" cost of construction is assumed to be $1.5 million per school.

At an assumed maximum school construction levy of 5 mills, the table shows that the cost to build one average school in Edmonton District #7 in a given year would be borne entirely by the district ratepayers at a levy rate considerably below the 5 mill maximum. The same school built in either Medicine Hat District #76 or St. Paul County #19 would be substantially financed by the Province to the extent of 83% and 97% of approved cost respectively, although the local ratepayers would be assessed the full 5 mill maximum school construction levy.

If five new schools were required in a given year, the Edmonton District would receive assistance of $1,737,000 or 23% of the total approved cost. Assuming a spectacular growth rate in a small city such as Medicine Hat, construction of the same five schools would be provincially supported in the amount of $7,244,000 or 97% of total approved cost. No comparative figures are provided for St. Paul County since it is most unlikely that five new schools would be required in the same year in an essentially rural district.

If a large city such as Edmonton were to require ten new schools in a single year, the table shows the provincial support level to be $9,237,000 or 62% of total approved cost. The local financing requirement is limited to $5,763,000 at a 5 mill maximum school construction levy. At this rate and at an average school cost of $1,500,000, it is apparent that Edmonton would be expected to finance the cost of its first three new schools in a given year from local tax revenues. It would receive partial provincial assistance for its fourth school and full support for every new school in excess of four. The ongoing rapid growth of the Edmonton and Calgary suburbs may be expected to continue local ratepayer demands for considerably more than four new schools per year. It is evident, therefore, that a higher maximum mill rate is required if this funding mechanism is to support the planning process by dampening these demands. The bottom half of the table shows the results of increasing the maximum mill rate for the school construction levy to 10.

With a maximum mill rate of 10, school construction in Edmonton does not become fully supported by the Province in a given year until after eight average schools are built. Smaller districts such as

Medicine Hat and St. Paul County continue to be substantially funded by the Province, however, although the rate of support drops to 66% and 94% of approved construction costs respectively for the first school built each year.

2. Limit Provincial Funding to the Reciprocal Percentage which the Local Equalized Assessment Base Bears to the Total Provincial Assessment Base

a) Outline of the Suggested Mechanism

Under this mechanism the approved construction cost of new facilities is first calculated on a square footage basis as under the existing method. Whereas existing funding arrangements call for the Province to support debentures for the total amount of these approved costs, this proposal would limit the provincial support to the reciprocal percentage relationship which the local assessment base bears to total provincial assessment. For example, a large, relatively wealthy district having 25% of total provincial assessment would be supported to the 75% level of approved costs. A much smaller district, having only 1% of the provincial total assessment, would receive 99% of the approved cost of its construction program.

b) Advantages and Disadvantages

The advantages of this method are:

i) It Shifts the Financing Burden Partially Toward the Local Boards

The premise that local boards will be more vigilant in their planning if they are required to pay a larger proportion of the cost of school construction is supported. The large urban boards which have been exerting the greatest demand for additional facilities will be required to pay the greatest percentage of the cost of these facilities from local revenues.

On the other hand, smaller boards with a marginal proportion of total provincial assessment will continue to be funded very near the existing total support level. Most often it is these small boards whose need for additional facilities can be more readily supported or challenged by the School Buildings Board.

ii) Dollar for Dollar the Local Share of Construction Costs Can be Raised Through a Levy of the Same Mill Rate Regardless of the Relative Wealth of the District

The local proportion of financing required depends upon the ratio of the district's equalized assessment to total provincial assessment. Therefore, the cost of constructing the identical facility in a small district as in a large district will cost the local ratepayers an identical number of mills. For example, the local share of $1,000,000 worth of construction in Edmonton is approximately 0.2 mills. The same facility constructed in St. Paul County would similarly cost its ratepayers the identical 0.2 mills.

Two significant disadvantages of this mechanism accrue as follows:

i) Local Boards in Rapidly Growing Districts would be Required to Assess a Higher Levy than Boards in a More Stable Area

Since the mill rate levy required for each dollar of approved construction costs is identical regardless of district, it follows that a district requiring more school construction must assess a higher levy than one requiring little or no construction. While this objection may not be considered serious in the high growth districts of Edmonton and Calgary, which should have access to disposition proceeds from unused central city facilities, it may be more serious to a rapidly growing boom town such as Fort McMurray.

ii) Determination of the Reciprocal Percentage for a District is More a Function of Size than of Wealth

This mechanism could be challenged on the grounds that the ratepayers of a populous but relatively poor district may be required to pay a higher percentage of the approved construction costs than the wealthier ratepayers of a much smaller but more affluent district. In our view these objections are not serious in that the mill rate assessed against an individual ratepayer in the larger but poorer district will be no more severe than that levied against the wealthier ratepayer residing in the smaller district. Under this mechanism the relative ability of a district to pay for each dollar of its own construction costs is determined by the size of its total assessment base relative to that of the total province. A poorer district would presumably have a larger number of individual ratepayers from which to raise its share of the costs than would a wealthier district having an identical total assessment base.

c) Examples of the Results of Applying This Method of Capital Funding

The relative local and provincial shares of approved construction costs, based on equalized assessment values per the Financial and Statistical Report of Alberta School Boards Fiscal Year 1974, are shown in Table 11. The construction of one average school at a cost of $1,500,000 in each of the three example districts is seen to require local financing in the amount of 0.3 mills. However, in terms of locally financed dollars, the large Edmonton board is seen to require a total considerably in excess of that of the other two boards, a reflection of its much higher assessment base.

When five new schools are required in a given year, the table indicates that a 1.6 mill levy is required. Since only the Edmonton and Calgary school districts are likely to require more than five new schools in any one year, it is likely that only those boards would ever require additional levies exceeding 1.6 mills.

3. Change the Existing Square Footage Support Rates to Reflect a District's Ability to Pay

a) Outline of the Suggested Mechanism

The first two methods already discussed relate to those costs which are approved by the Province through the School Buildings

TABLE 11

FUNDING MECHANISM ALTERNATIVE #2

LIMIT PROVINCIAL FUNDING TO THE RECIPROCAL PERCENTAGE WHICH THE LOCAL EQUALIZED ASSESSMENT BASE BEARS TO THE TOTAL PROVINCIAL ASSESSMENT BASE

(in $ thousands)

TOTAL PROVINCIAL EQUALIZED ASSESSMENT BASE IN 1974 = $4,591,598

	Large Urban Edmonton District #7	Small Urban Medicine Hat District #76	Rural St. Paul County #19
Local District Assessment	$1,152,607	$51,221	$8,566
% of total = local share %	25.1%	1.1%	0.2%
reciprocal % = provincial share %	74.9%	98.9%	99.8%
Build one school			
Local share	$ 337	$ 17	$ 3
- expressed as mill rate	0.3	0.3	0.3
Provincial share	1,123	1,483	1,497
Total approved construction cost	$ 1,500	$ 1,500	$1,500
Build five schools			
Local share	$ 1,883	$ 83	N/A
- expressed as mill rate	1.6	1.6	
Provincial share	5,617	7,417	
Total approved construction cost	$ 7,500	$ 7,500	
Build ten schools			
Local share	$ 3,765	N/A	N/A
- expressed as mill rate	3.3		
Provincial share	11,235		
Total approved construction cost	$ 15,000		

Board. Approved costs are calculated by applying standard square footage rates to the approved space as explained in sub-section II. The actual cost of a given project could be less than the approved cost although, in most recent instances, the actual cost has been found to exceed the approved cost. At present, the approved costs, which are paid for entirely by the Province, are averaging about 90% of actual costs. One method to shift school construction costs to the local boards would be to lower the provincial support level to something less than 100% of the approved costs or by lowering the approved costs themselves by paying a lesser percentage of the existing standard square footage construction cost rates. To be equitable, however, such a reduction in the percentage should not be uniform for all districts as this would only heighten the disparity which now exists between the individual boards' abilities to provide quality facilities over and above the floor level supported by the standard rates. A fairer means of determining a district's provincial support rate would be based on the reciprocal percentage that local assessment for that district bears to total provincial assessment. Since this is simply a variation in application of the formula used under alternative 2, it is not surprising that the same results will be achieved. That is, a district with 25% of the total provincial assessment will receive 75% of the existing standard square footage cost rate (i.e. 75% of the approved cost).

b) Advantages and Disadvantages

While this method provides the same results as alternative 2, if applied strictly as outlined above, it can offer certain theoretical advantages as follows:

i) Standards for Individual Districts Can Be Developed

Without changing the principle of the mechanism it is possible to recognize individual differences in construction costs and other factors between districts through development of individual square footage support rates. Consideration of such factors would represent an extension of the existing practice whereby an extra allowance is added to the standard rates according to distance from the nearest urban centre. Each local board could be advised a year in advance of the square footage provincial support rates it could expect for approved new space. The flexibility of the system would allow individual boards to petition for an adjustment to the rates to be applied to its district where special circumstances warranted such action.

ii) The Overall Level of Provincial Support Can Be Readily Adjusted

According to changing conditions the Province may wish to increase or decrease its overall support for school construction from the levels which would otherwise result from application of this mechanism. This could be done readily without destroying the inherent fairness of the system, as it relates to each dollar spent, by application of a multiplier of plus or minus 1.0 to the local share.

The advantages of flexibility of this mechanism are partially offset by the following disadvantage:

i) There is Discrimination Against Rapid Growth Districts

As for alternative 2, the equity of this mechanism relates to the proportion of each school construction dollar a district can fairly be expected to raise from its own local tax revenues. That is, a district having a tax assessment base of ten times that of its neighbouring district may fairly be expected to raise locally ten times the amount of each dollar to be spent on school construction. What the mechanism fails to consider is that, assuming an equal rate of student enrolment growth, the larger district will also require ten times as many additional student spaces at ten times the construction cost.

c) Example of the results of the method's application

Table 12 illustrates the results of changing the existing square footage support costs for the three sample school districts according to their ability to raise school construction costs locally. A comparison to Table 11 indicates that the percent of provincial and local shares are calculated in the same manner as for alternative #2. The two methods differ from that point, however, as under alternative #3 the relative shares of the province and the local boards are applied to the standard square footage cost allowance for each of the districts. In the examples, it is assumed that the cost per square foot for building a basic school facility in Edmonton is $30. In Medicine Hat, costs are assumed to be slightly higher at $31 per square foot, possibly as a reflection of fewer competing contractors, higher costs of building materials, etc. Finally, the unit cost in the more rural district of St. Paul County is assumed to be higher still at $32 per square foot of basic school construction.

TABLE 12

FUNDING MECHANISM ALTERNATIVE #3

CHANGE THE EXISTING SQUARE FOOTAGE SUPPORT RATES TO REFLECT A DISTRICT'S ABILITY TO PAY

(in $ thousands)

TOTAL PROVINCIAL EQUALIZED ASSESSMENT BASE IN 1974 = $ 4,591,598

	Large Urban Edmonton District #7	Small Urban Medicine Hat District #76	Rural St. Paul County District #19
Equalized assessment	$ 1,152,607	$ 51,221	$ 8,566
% of provincial total = local share %	25.1%	1.1%	0.2%
Reciprocal of % of provincial total = provincial share %	74.9%	98.9%	99.8%
Standard $ per square foot	$ 30.00	$ 31.00	$ 32.00
Local rate per square foot	$ 7.53	$ .34	$ .06
Provincial rate per square foot	$ 22.47	$ 30.66	$ 31.94
One school built - # of square feet	50,000	50,000	50,000
Local share	$ 376	$ 17	$ 3
Mill rate	0.3	0.3	0.4
Provincial share	1,124	1,533	1,597
Total approved cost	$ 1,500	$ 1,550	$ 1,600
Five schools built - # of square feet	250,000	250,000	
Local share	$ 1,883	$ 85	N/A
Mill rate	1.6	1.7	
Provincial share	5,617	7,665	
Total approved cost	$ 7,500	$ 7,750	
Ten schools built - # of square feet	500,000		
Local share	$ 3,765	N/A	N/A
Mill rate	3.3		
Provincial share	11,235		
Total approved cost	$ 15,000		
Consider 25% more local funding			
Standard $ per square foot	$ 30.00	$ 31.00	$ 32.00
Local rate per square foot	$ 9.41	$ .43	$ .08
Provincial rate per square foot	$ 20.59	$ 30.57	$ 31.94
One school built - # of square feet	50,000	50,000	50,000
Local share	$ 471	$ 22	$ 4
Mill rate	0.4	0.4	0.5
Provincial share	1,029	1,528	1,596
Total approved cost	$ 1,500	$ 1,550	$ 1,600

Application of the local share percentage to the allowed standard cost per square foot gives similar local share dollars as alternative 2. The only difference (which would be more clearly apparent without rounding to the nearest $1,000 and through extension to more decimal places) is that the mill rate equivalent of the local board's share is slightly higher in Medicine Hat than in Edmonton and higher still in St. Paul County. This is a function of the higher construction cost standards assumed in these districts rather than a function of size of the assessment base.

Ignoring these small differences in mill rate equivalent of each district's share, the table shows that an increase in the amount of construction to five schools increases the local mill rate required proportionately and these increases in mill rate are uniform regardless of which district requires additional facilities. Thus this funding mechanism places an equal burden, in terms of mill rate, on property taxpayers of all districts requiring a similar amount of additional school facilities. However, the possibility of Edmonton requiring ten new schools in a given year may be very real whereas the likelihood of St. Paul County or even Medicine Hat requiring that many new facilities in a single year is virtually non-existent.

The bottom portion of the table illustrates the effect of requiring the boards to increase their local share of the funding by 25%. Again it is apparent that, if we ignore the small discrepancy which results from using different unit standard construction cost rates, the local share of the cost in terms of mill rate remains uniform across all school districts. Thus, the Province can readily alter the local share of school construction costs and conversely its own share, through a simple adjustment without destroying the equitable principle on which this funding alternative is based. At the same time, flexibility is retained to adjust an individual district's standard square footage cost base to reflect local variations in construction costs.

4. Shift Full Responsibility for the Provision of School Facilities to the Province

a) Outline of the Mechanism

It is well established in Alberta that each local school board has a prime responsibility to ensure that public education within its district meets the highest standards possible within the resources available. Traditionally, this responsibility has included the provision and maintenance of school facilities suitable to the educational programs offered.

Under this funding mechanism alternative, the prime responsibility for providing and maintaining suitable physical facilities would be removed from the local boards and vested in an appropriate government department, either within or outside of the Department of Education. Such a step would, in no way, be intended to infringe upon the boards' existing level of authority in establishing and operating educational programs. The local boards would still be responsible for the definition of need for educational facilities. It is only the actual construction or modifications in response to the definition of need that would be shifted to the Province. The relationship between local boards and provincial authorities and the responsibilities of each in ensuring that proper school facilities were available where required would need to be defined clearly as part of the planning process.

With the actual construction of facilities being managed centrally by the Province, the Province would also undertake to finance all capital costs completely from provincial revenues and ownership of the facilities would remain with the Province.

b) Advantages and Disadvantages

The major advantages to having the Province finance and manage the provision of school facilities are:

i) Broader Community Facilities Can Be More Readily Considered

Since the construction of all public buildings is paid for by the taxpayer at one level or another, there is a growing trend in several jurisdictions toward developing multi-purpose community facilities. By centralizing responsibility for the provision of schools within a provincial department (such as Public Works, for example), the total community need for educational, social, cultural and recreational facilities can be considered when planning new facilities.

Under this proposed funding mechanism, the department concerned with providing public facilities would be required to respond to the need for educational facilities as determined by the local boards together with the assistance of Alberta Education. However, these educational needs could be blended with the requirements of other government sectors, both local and provincial, to provide composite use facilities at less total cost to Alberta taxpayers generally.

ii) A Higher Level of Expertise would be possible in the Planning and Management of School Facilities

The planning and construction of modern facilities is a highly specialized field which requires the training and experience of qualified professionals to assure best results at the lowest possible cost. It is likely that only a few school districts in Alberta possess the sustained growth rate to have developed a high level of expertise in this field. A shift in the responsibility for the provision of school facilities to the Province would guarantee that every school district would equally secure the benefit of this expertise toward the planning of new facilities, remodelling of existing facilities and the associated construction management.

iii) Increased Buying Power could mean Lower Construction Costs

As for most areas of business, the increased buying volume associated with centralized purchasing could be expected to trigger volume discounts for certain construction materials or contract work.

iv) Maximum Flexibility could be Attained for the Use of Portable Facilities

With the ownership of school facilities remaining with the Province, portable facilities could be more efficiently deployed through the crossing of school district boundaries as circumstances required. Under the existing system whereby facilities are owned by the boards, it is rare that an idle portable facility owned by one board would be provided to another board experiencing space shortages.

v) Alternate Financing Methods Could be More Readily Considered

Under the existing funding mechanism, the debenture process is used almost exclusively to furnish those capital funds to be provided out of future dollars. Other means of financing may be superior in certain instances but are rarely considered seriously by most boards. For example, leasing of space is not usually attractive to a board, except on a very short-term basis, since rental costs must be paid from operating funds and are not even partially reimburseable by the Province. A board is, therefore, ahead financially to buy the space required and finance its purchase or construction through the debenturing process under which about 90%, on average, of the debt service costs will be assumed by the Province.

Total provincial responsibility for financing, as well as for construction, would allow the provincial department concerned to adequately consider all reasonable financing alternatives, including leasing where appropriate.

vi) Funding is Entirely Through More Progressive Forms of Taxation

The system of provincial funding and ownership is more equitable in terms of modern tax theory and current Canadian public opinion than is local ownership which is partially funded on the regressive property tax basis. In Alberta, the bulk of provincial revenues are provided from resource royalties and income tax collections, which are generally considered to be the most equitable revenues available.

vii) Disposition of Unneeded Space would be Facilitated

As stated previously, ownership of future new school facilities would rest with the Province. Consideration could also be given toward transferring the ownership of existing facilities from the local boards to the Province. Since the Province would then both own and manage the physical operation of all school buildings, it would be able to declare an unused or underutilized facility as superfluous to the needs of a school board as circumstances dictated, and accordingly could effect a conversion to another public use or arrange for the sale of the property. There would need to be an established set of criteria used to determine when a facility was no longer required for educational purposes and the local boards would be expected to have input into this type of decision. However, it is probable that more objectivity could be injected into a property disposition decision if the initiative were to originate from within a centralized provincial department having overall responsibility for multi-use public buildings. Initially, we would expect a better rationalization of existing space surpluses resulting in a significant reduction in the total amount of underutilized space in the Province to the ultimate benefit of Alberta taxpayers, generally.

Major disadvantages to making the provision of school facilities a provincial responsibility would be:

i) A Perceived Erosion of Local Initiative

The transfer of what has traditionally been a local responsibility for providing educational facilities as part of the total educational program will undoubtedly be seen by many as a deterrent to local initiative in developing new school designs, etc. in which a local community can take pride. Providing that an improved school planning process is incorporated to include local input at the design stage, we do not see this objection as being valid. In practice, the involvement of the central authorities at the early planning stages should ensure that there is a cross fertilization of interesting new design and construction concepts.

ii) The Planning Process Could Become Needlessly Complicated

In previous sections of this report the features of an improved planning process have been described. The increasing consideration of having new school facilities fit into a concept of more flexible multi-use buildings provided under a provincial public works approach will necessarily increase the range of interested parties into non-educational areas. Unless the planning process can clearly establish the responsibilities of each local and provincial department affected, the cost saving and flexibility benefits which would otherwise accrue from centralized facilities management and ownership could be partially negated by the complications of having to satisfy a wider range of interests.

c) Examples of the Results of Applying this Method of Capital Funding

Full provincial support to the provision of school facilities (in conjunction with other community facility requirements) through a provincial facilities group and 100% provincial funding would shift the financing burden for school capital costs further from property taxpayers to the payer of income tax and resource revenues. The amount of this tax shift would vary from one school district to another depending upon the degree to which each district would otherwise exceed the established provincial school construction support levels based upon standard square footage allowances applied to approved school space. For the average district, which raises about 10% of its total school capital costs locally, the savings to property taxpayers would be 10¢ on every dollar of future school construction. This figure cannot be expressed as an overall mill rate equivalent due to the wide variation in the size of the property tax bases among districts. However, Table 13 indicates the mill rate equivalent saving for the three sample districts assuming that one, five and ten typical schools are built per year at an average cost of $1.5 million each. To offset these savings to local property taxpayers, typical province-wide annual capital costs totalling $30 million would, assuming 10% average local funding, cost Alberta income taxpayers an additional $3 million. If this were to be paid out of the current year's provincial income tax revenues, the amount would be equivalent to an approximate .6% surtax on total Alberta personal and corporate income taxes.

UTILIZATION MECHANISM

The tendency on the part of certain school boards to acquire more facilities than warranted by the total student population within their districts could be effectively controlled through application of the following utilization mechanism in conjunction with any of the above four funding mechanisms or with the existing funding mechanism.

TIE PROVINCIAL SUPPORT TO THE RATIO OF EXISTING STUDENT SPACES TO ENROLMENT PROJECTIONS

a) Outline of the Suggested Mechanism

An effective method for discouraging the overbuilding of school space would be to establish a maximum acceptable ratio of total school spaces in a district to the maximum enrolment projected in the next few years in that district. In order to permit the required flexibility over the type of space required, it may well be necessary to compute more than one such ratio for each district. For example,

TABLE 13

FUNDING MECHANISM ALTERNATIVE #4

SHIFT FULL RESPONSIBILITY FOR THE PROVISION OF SCHOOL FACILITIES TO THE PROVINCE

(in $ thousands)

	Large Urban Edmonton District #7	Small Urban Medicine Hat District #76	Rural St. Paul County District #19
Equalized assessment base in 1974	$1,152,607	$51,221	$8,566
Saving to local taxpayers assuming 10% of capital cost would otherwise be paid locally			
Build one school annually			
Capital cost	$ 1,500	$ 1,500	$1,500
10% local share saved	150	150	150
Mill rate equivalent	0.1	2.9	17.5
Build five schools annually			
Capital cost	$ 7,500	$ 7,500	N/A
10% local share saved	750	750	
Mill rate equivalent	0.7	14.6	
Build ten schools annually			
Capital cost	$ 15,000	N/A	N/A
10% local share saved	1,500		
Mill rate equivalent	1.3		

individual ratios may be required for each of elementary, junior high and senior high. In addition, the space to student ratio in each sector will need to exceed a one to one ratio by an amount sufficient to provide further flexibility between class sizes by grade, subject area, etc. as applicable.

Under these space controls, the Province would refuse to provide any support to a local board requesting additional space which would cause its relevant space to enrolment ratio, or "utilization ratio", to exceed the established maximum. In enforcing this rule the provincial authorities may be required to make the occasional exception in the case of a rural board covering a large geographical area, but such exceptions should be very few.

Any board requesting provincial financial assistance toward construction of additional facilities which would otherwise cause the utilization ratio to be exceeded would be faced with a choice of:

i) Disposing of some existing space which may be underutilized due to a geographical shift in the student population within its boundaries.

ii) Transporting students from the area where new facilities are desired to existing facilities elsewhere in the district.

iii) Building the desired new facility without any provincial financial support.

The actual amount of provincial support provided within the constraints of the utilization ratio could be determined as under the existing mechanism or any of the other mechanisms outlined in this section. The degree to which the Province would support the capital funds which qualify under these constraints could be further refined depending upon how closely a district's utilization ratio approached the maximum amount over which no provincial funds would be forthcoming for further facilities. For example, if the maximum utilization ratio were set at 1.25 : 1, the Province would provide no support for construction in a district where this ratio was already exceeded. It could further be established that a district having a ratio between 1.25 and 1.20 to 1 qualified for 50% provincial support based on approved capital cost requirements. A ratio of 1.15 to 1.20 might qualify for 75% support and any ratio below 1.15 would receive 100% provincial support.

b) Advantages and Disadvantages

Several clear cut advantages exist for this mechanism:

i) Discourages Overbuilding

Any board wishing to exceed the reasonable maximum ratio established under this mechanism would be much less likely to do so if it had to rely entirely on its own local tax base for 100% of the construction funds. In this manner, this particular alternative addresses itself directly to the major problem of the large urban boards' desires to provide facilities in each new suburban neighbourhood while existing facilities in older neighbourhoods are largely underutilized.

ii) Encourages Disposition of Underutilized Facilities

In an effort to stay within the maximum total space constraints imposed by the utilization ratio, a board will be encouraged to dispose of any unused facilities it owns and to consolidate underutilized facilities so as to cause a portion of them to become dispensable. Such disposition, while initiated by the local board, should be under the procedures described in the facility disposal section of this report.

iii) Encourages More Effective Space Planning at the Local Level

Since it is unlikely that local boards will look too kindly on being forced to dispose of underutilized facilities, they will be encouraged by this funding mechanism to look further ahead at enrolment projections by area within their districts. Any tendency to request additional facilities in a neighbourhood where the current enrolment demands will be less severe in only a few years should be discouraged, as the board would then be faced with the possible need to dispose of a relatively new facility in order to help keep its utilization ratio in future within the maximum allowed.

iv) Much of the Financing of New Construction would be Generated Internally within the School System

The amount of capital funding required for new school facilities could be reduced by applying the proceeds of disposition of unneeded existing facilities against the cost of new construction. It is impossible to predict the amount that might be realized from such proceeds across the Province without first undertaking a detailed space inventory study. However, since many of the underutilized facilities are located near the core of the urban centres, it is likely that a considerable sum could be generated through sale of these facilities, particularly where the site is also owned by the school boards without restrictions on that ownership.

The chief disadvantages to this mechanism would appear to be:

i) Area Opposition to School Closings

Students attending those underutilized facilities designated for disposition by a local board would need to transfer to another nearby school. A certain amount of parental opposition could be expected to any such school closing proposal.

ii) Possible Delays in Building Certain New Facilities

To be most effective, the policy of controlling the size of the school facility system through a ratio based on enrolment projections must be strictly adhered to. In certain situations, however, the disposition of unneeded facilities may not be practicable or possible and thus deny a board the right of

TABLE 14

FUNDING UTILIZATION MECHANISM

TIE PROVINCIAL SUPPORT TO THE RATIO OF EXISTING STUDENT SPACES TO ENROLMENT PROJECTIONS

Assume the following scale of provincial support levels:

Student Space/Projected Enrolment Ratio	% of Approved Costs Supported
Over 1.25	NIL
1.20 - 1.25	50%
1.15 - 1.20	75%
Under 1.15	100%

District A

Present inventory of student spaces = 12,675

Enrolment projections - next year = 9,820
- year after = 10,000

Existing Student Space/Projected Enrolment Ratio = 1.2675

Eligibility for Provincial Support for Additional Facilities = NIL

Disposal of 2 schools totalling 1,115 spaces

Adjusted number of school spaces - 12,675 - 1,115 = 11,560

Adjusted Student Space/Projected Enrolment Ratio = 1.1560

Eligibility for Provincial Support for Additional Facilities = 75% of approved costs.

access to provincial funds to build a badly needed facility in another area of its district. Delays in new construction caused through such circumstances could be temporarily overcome through the bussing of students to other areas where space is available.

c) Examples of the Results of the Method's Applications

The use of this utilization tool is illustrated in Table 14 opposite. Since its application would be uniform across all school districts, there is no need to carry the analysis through the three sample districts to illustrate its results. Instead, we have selected a hypothetical District A. In actual practice it is likely preferable to apply the technique to each major class of school space within a district (i.e. elementary, junior secondary and senior secondary).

The provincial support level scale is assumed to be as shown for illustrative purposes only and does not necessarily represent our opinion of what these support levels should be. For simplicity a series of ratio ranges is used in the example, although this does produce a truncating effect which could be eliminated through use of a mathematical formula to be applied over the full range of support levels. Such a formula could be structured with values that would increase the incentive for districts to trim unneeded space.

District A in the example wishes to build a new school in an expanding neighbourhood but calculations show that it already exceeds the maximum utilization ratio that is required to qualify for any provincial support for the capital required. In calculating the utilization ratio, the maximum enrolment projection of 10,000 students over the next two years is used. Careful analysis by board members allows a consolidation of students in older neighbourhoods to the point where two schools with a total of 1,115 spaces are considered surplus to the board for the foreseeable future. Accordingly, these schools are closed and the properties are sold to a real estate developer. The reduction in the number of student spaces owned by the board reduces the district's utilization ratio to 1.1560, a level at which the new school desired by the board is eligible for 75% of the provincial support figure determined by the funding mechanism in force.

Conclusions

Recommendation and selection of the most appropriate funding mechanism (and the attending rates or percentages) for future school construction in Alberta must obviously consider the current administrative and political realities faced by the Province's educational officials and legislative members. This Section has presented a number of funding alternatives, each of which has certain advantages and disadvantages. Before presenting our recommendation as to which alternative we believe to be most appropriate to the current situation in Alberta, it may be useful to summarize very briefly the degree to which each alternative addresses the principal factors set out on page 135.

Funding Mechanisms

1. Local School Construction Levy to a Specified Maximum Mill Rate

This method:

i) Reinforces the need for adequate local planning by shifting part of the financing burden to the districts, at least to the point where the maximum mill rate specified is reached.

ii) Does not interfere with local school district autonomy.

iii) Maintains a fair degree of equity of educational opportunity.

iv) Will not, in itself, discourage overbuilding in the major urban centres unless a high maximum mill rate is specified; a relatively low rate would tend to be exceeded by these districts even with a reduced building program.

2. Limit Provincial Funding to the Reciprocal Percentage which the Local Equalized Assessment Base Bears to the Total Provincial Assessment Base

This alternative:

i) Further reinforces the need for adequate local planning in that part of every construction dollar must be raised from the local ratepayers without regard to any maximum.

ii) Does not interfere appreciably with local school district autonomy.

iii) Maintains a fair degree of equity of educational opportunity on a total district basis in that each construction dollar needed requires the levying of an identical mill rate regardless of district. However, when considered from the standpoint of an individual ratepayer, there may be some unfairness as a ratepayer in a rapidly growing district would pay more than would his counterpart owning a property with an identical equalized assessment located in a more stable district.

iv) Addresses the tendency to overbuild new facilities as each additional construction dollar requires a portion to be raised from the local ratepayers.

3. Change the Existing Square Footage Support Rates to Reflect a District's Ability to Pay

The suggested method incorporates the same reciprocal percentage principle as alternative #2, and, as such, addresses the various key factors with the same results. However, this method permits greater flexibility through the development of standards for individual districts that reflect special circumstances in those districts.

4. Shift Full Funding Responsibility for the Provision of School Facilities to the Province

This funding alternative is most closely connected to the need for changes in the planning process and, as such, would represent the most radical departure from the existing means for providing school facilities in Alberta. This method, as outlined, would undoubtedly be the most difficult to put into practice but, if introduced may be expected to:

i) Reinforce the need for adequate local planning, involving both local and provincial education officials, and, where a multi-use facility was involved, officials responsible for other public services.

ii) Erode local school district autonomy unless strict associated measures were taken to protect such local autonomy.

iii) Strengthen the concept of equity of educational opportunity by removing the funding burden totally from the local ratepayers.

iv) Deal with the problem of surplus space in the large urban centres through more effective rationalization of space needs and the disposition or conversion to other purposes of unneeded school space.

Utilization Mechanism

Tie Provincial Support to the Ratio of Existing Student Spaces to Enrolment Projections

This utilization mechanism:

i) Reinforces the need for adequate local planning by effectively penalizing those local boards desiring new space when other existing space is available.

ii) May be seen to interfere with local autonomy by placing an added restriction on the school districts. However, it does not take away local initiative in that district; officials themselves would still be in control of deploying the total space allowed them under the formula.

iii) Should have no significant positive or negative effect on the equity of educational opportunity.

iv) Addresses itself squarely to the tendency to overbuild in the major urban centre, where the surplus school space in the Province is now concentrated.

RECOMMENDATIONS

Consideration of the alternatives presented reinforces our view that no funding mechanism, by itself, can substitute for the need for sound school facility planning procedures. The possibilities presented in this Section represent our opinion of the most appropriate choices available for Alberta in today's environment. Of these possibilities we believe that funding alternative number 3, together with the utilization mechanism, would be the best choice to support the need for improved planning of future school construction. This combination clearly addresses the largest single question faced by school facility planners, that of building new schools in major districts of shifting school populations, but where total future enrolment is expected to stabilize or decline, thus adding to the surplus space already available. At the same time, the principles of preserving local autonomy and equalization of educational opportunity are not, in our opinion, undermined. Some additional burden will be placed on school facility planners and there will undoubtedly be a certain amount of parental objection raised as some city core schools are closed and the demand for certain new suburban schools is denied or delayed. Such objections should be temporary, however, until the excess space problem becomes resolved.

Therefore, we recommend that Alberta Education:

1. Change the existing square footage support rates to reflect a district's ability to pay. The ability to pay should be based on the reciprocal percentage which the local equalized assessment base bears to the total provincial assessment base and the square footage support rate to be applied to a particular district should recognize differences in local construction costs and other specific circumstances which affect that district relative to provincial average costs.
2. Tie provincial support to the rates of existing student spaces to enrolment projections through the introduction of a utilization ratio which would decrease the support eligible to any district which already has excess space according to the ratio chosen.

APPENDICES

APPENDIX I

PERSONS INTERVIEWED

Woods, Gordon & Co. and Brooker Engineering, gratefully acknowledge the cooperation of the following persons and wish to express appreciation for the time made available for meaningful interviews.

Alberta Education

Mr. R. Penrice, Administrative Assistant to the Minister
Dr. S.N. Odynak, Associate Deputy Minister
Dr. J.W. Kulba, Director School Buildings Administration, Chairman, School Buildings Board
Mr. J.H. Blocksidge, Associate Director, School Buildings Administration, Member School Building Board
Mr. L.S. Grant, Secretary School Buildings Board
Mr. W.J. Ede, Member, School Buildings Board
Dr. J.E. Reid, Director, Student Evaluation and Data Processing
Dr. W.R. Duke, Director Planning and Research
Mr. W.L. Hill, Associate Director Planning and Research
Dr. H.G. Sherk, Associate Director Planning and Research
Dr. W.E. Hathaway, Educational Consultant
Dr. W.P. Eddy, Educational Consultant
Mr. A. Bredo, Director Finance, Statistics, Legislation
Mr. J. Holden, Architect School Buildings Branch
Mr. M.A. Weleschuk, School Buildings Branch
Mr. W. Belous, School Buildings Branch
Mrs. H. Skirrow, Librarian
Mr. N.J. Chamchuk, Director Communications
Dr. B.L. Stringham, Director Field Services
Mr. W.T. Worbets, Associate Director, Field Services
Mr. D. Ewasiuk, Coordinator, Educational Opportunities Fund
Mr. H. Lehmann, Field Administration Officer

Alberta Bureau of Statistics

Mr. R.T. Lennon, Labour Statistics
Mr. D. Monson, Chief Inspector, Standards Branch

Alberta Treasury Department

Mr. H.H. Strohbach, Director of Finance, Member of School Buildings Board

Department of Parks, Recreation, and Wildlife

Mr. D. Rudge, Assistant Director, Community Recreation Services

Department of Labour

Mr. D. Monson, Chief Inspector, Standards Branch

Department of Municipal Affairs

Mr. W.D. Isbister, Deputy Minister and Chairman Provincial Planning Board
Mr. N. Dant, Planning Consultant

Alberta Municipal Finance Group

Mr. R.A. Splane, General Manager
Mr. A.D. O'Brien

University of Alberta, Faculty of Education

Dr. E.J. Hodgson, Professor

Alberta Educational Communications Corporation

Mr. L.T. Shorter, President

Alberta, Boards of Education (Administrators)

Calgary Public	- Mr. G.E. Holmes
	- Mr. Mills
	- Mr. J. Smart
	- Mr. G. Branson
Calgary Separate	- Mr. J.V. Van Tighem
Edmonton Public	- Mr. M.A. Strembitsky
	- Dr. C. Smith
	- Mr. G. Luck
Edmonton Separate	- Mr. H.A. MacNeil
	- Mr. W. Pasternak
Grande Prairie	- Mr. K. Wagner
	- Ms. M. Moffett
Medicine Hat	- Dr. K.C. Sauer
	- Mr. F.B. Allore
Lethbridge	- Mr. C.E. Burge
	- Mr. R. Himsl
Fort McMurray	- Mr. J.L. Sacher

Alberta, Boards of Education (Cont'd)

Red Deer - Mr. G.H. Dawe
- Mr. J. Docherty

St. Albert - Dr. W.G. Zielinski

County of Strathcona - Dr. G. Rancier

Foothills School Division - Mr. J.E. Finnman

Camrose School District - Mr. E.G. Hohn

Rangeland School Division - Mr. W. Terriff

Calgary School Division - Mr. J.C. Macdonell

Municipal Planners

Calgary
Edmonton
Grande Prairie
Medicine Hat
Lethbridge
Fort McMurray
Red Deer
St. Albert
Sherwood Park

School Board Members

Mrs. Craigie, Chairman, Red Deer School District
Mr. Bill Leslie, Member, Grande Prairie School District

Alberta Associations

Conference of Alberta School Superintendents:	Mr. A. Myhre Stony Plain
The Alberta School Trustees Association:	Mr. S. Maertz Mr. D. Vizina Mr. L. Tymko C. Rea
The Alberta Teachers' Association:	Dr. N.R. Hrynyk
The Federation of Home and School Associations:	Mrs. D. Christie

Alberta Associations (Cont'd)

The Alberta Association of Architects:	Mr. M. Workun Mr. G. Terresmette
The Alberta Association of Professional Engineers	
The Alberta Construction Association	
Alberta School Plant Officials	Mr. D. Pettinger
Alberta Association of Municipal Districts and Counties:	Mr. J.E. Edworthy

Portable Classroom Manufacturers

Prince Edward Island

Mr. R. Ewings - School Construction Manager

Newfoundland

Mr. M. Riggs - Chief Superintendent
Mr. R. Adams - Engineer School Construction

Nova Scotia

Mr. McGuire
Mr. Higden
Mr. Baker - Director Planning D.P.W.

New Brunswick

Mr. R. Leblanc - Architectural Department

Quebec

Mr. J.L. Giroux - Manager, Land and Buildings

Ontario

Mr. D. Mathews - Chief Architect, Department of Education
Mr. S. Orlowski - Chief Architect, Ministry of Colleges and Universities
Mr. D. Patterson - Supt. Design and Construction, North York
Mr. K. Cochran - Supt. Design, Toronto Separate School Board
Mr. Rankin - Assistant Chief Architect, Department of Education

Scarborough Board of Education

Mr. Goodwin
Mr. Leonard - Superintendent of Plant

Etobicoke Board of Education

Mr. Wm. Moore - Controller of Planning and Plant

Peel Board of Education

Mr. D. Lawson - Superintendent
Mr. J. Fraser

Ontario Institute for Studies in Education

Dr. Brock Rideout, Professor

Toronto Board of Education

Mr. Facey - Superintendent of Plant

Ontario Ministry of Housing

Mr. Gibson

Halliday Homes

Mr. Dewar - Vice-President Cdn. Portable, Structures Division

Ontario Ministry of Education

Mr. G.A. Spey - Director School Business and Finance Branch

Manitoba

Mr. B. Epps - Superintendent of Construction
Mr. D. St. Lawrence - Architect

Saskatchewan

Mr. N. McCulloch

British Columbia

Mr. F. Simpsons - Director Facilities Development

U.S.A.

Mr. Hugh McLaren - Executive Director
Division of School Buildings
City of New York

Educational Facilities Laboratory, New York City

Australia

New South Wales, Department of Education
Mrs. T. Cohen - Parents and Citizens' Association, Sydney

APPENDIX II

Woods, Gordon & Co.

MANAGEMENT CONSULTANTS

2400 THREE McCAULEY PLAZA
10025 JASPER AVENUE, EDMONTON, CANADA T5J 1T2
TELEPHONE 429-7261 (AREA CODE 403)

June 30, 1976

Mr. John Doe, M.A.
Superintendent of Schools
Omigawsh School Board
Omigawsh, Alberta

Thank you, Mr. Doe,

for any help you may be pleased to give Alberta Education regarding a genuine search for right answers for school construction and funding alternatives.

Alberta Education has commissioned Woods, Gordon & Co. to carry out the work described herein, and your assistance is earnestly requested to provide authorative comment for the questions which follow.

This response will be treated on a confidential basis by Woods, Gordon & Co. with replies consolidated, without identification, on a province-wide basis.

Please return the completed questionnaires for the schools in your jurisdiction to us at the above address. A return envelope is enclosed for your convenience and we look forward to hearing from you, and subsequently sharing the final report with you.

Yours truly,

Woods, Gordon & Co.

QUEBEC MONTREAL OTTAWA TORONTO HAMILTON KITCHENER LONDON WINNIPEG CALGARY EDMONTON VANCOUVER

THE PURPOSE OF THE STUDY

The purpose of this study is to analyse the criteria for determining elementary and secondary school space needs in Alberta; to relate these needs to viable construction alternatives and to recommend funding procedures which will both mitigate educational facility disparities throughout the Province and recognize the changing socio-economic conditions and public expectations affecting provision of educational facilities in Alberta.

SCOPE OF THE WORK

The quantitative parameters and qualitative characteristics of school building standards and practice are being analysed in Alberta and compared with other jurisdictions which have also demonstrated leadership in the provision of educational facilities. Based on substantive data, recommendations will be made regarding school accessibility, pupil space allocations, and the functional and physical characteristics of schools in Alberta.

This report will not deal with issues (albeit most important), such as student achievement, teaching methodology, course content or educational philosophy. The report will address the following additional elements important to educational facilities management:

- shifting populations
- declining enrolments
- accuracy of pupil population projections
- surplus space in the wrong place
- obsolete space
- rationalization of school facility utilization
- student bussing
- planning and implementation procedures
- the mutual interdependence and responsibility between the school boards and local and provincial governments for good stewardship and responsible control
- funding alternatives to equalize the accessibility and quality of school facilities throughout Alberta.

SCHOOL SURVEY

1. School Name:

Address:

2. School Code: ____________

3. Region or School Board Code: ____________

4. Name of School Jurisdiction: ____________

5. Main Building:

a) Age ____________

b) Number of Stories ____________

c) Type of Construction (circle)

Brick	1
Frame	2
Concrete	3
Other	4

d) Are there portable classrooms?

No	1
Yes	2
How many	___

e) In the last three years, how many portables have been

i) added ___
ii) or moved elsewhere ___

6. Insured Value of School Buildings ____________

7. Total Value of Debentures Outstanding on these School Buildings ____________

8. Total Gross Area of School Buildings (Sq.Ft.) ____________

9. Total Functional or Net Area (See definition on page 5) ____________

10. Total Area of School Site ____________

11. Instructional Areas Information

Type of Area	Number Of Rooms	Total Instructional Area (Sq.Ft.)
a) Early Childhood Services	________	________
b) Standard Classroom	________	________
c) Science Experience Rooms	________	________
d) Ancillary Classrooms	________	________
e) Industrial Arts	________	________
f) Home Economics	________	________
g) Library	________	________
h) Gym	________	________
i) Lunch/Study Room	________	________
j) Other	________	________
Total	________	________

12. Total Non-Instructional Area ________

13. Equipment

Please indicate your opinion of the built-in and/or instructional equipment available in each instructional or functional area by marking the appropriate number with a circle.

	Poor	Satisfactory	Excellent	Not Applicable
a) Early Childhood Services	1	2	3	4
b) Standard Classrooms	1	2	3	4
c) Science Experience Rooms	1	2	3	4
d) Industrial Arts	1	2	3	4
e) Home Economics	1	2	3	4
f) Library	1	2	3	4
g) Gym	1	2	3	4

14.

	No. of Students September 30	Grades Taught	Number of Students Bused	
			With Prov. Support	Without Prov. Support
1972-73				
1973-74				
1974-75				
1975-76				
1976-77 (est.)				

15. Approximately how many hours per week is the school used by members of the community in addition to the normal school body? ____________

16. Approximately how many people participate in community use of the school in a typical week? ____________

Comments

a) Should this school have more space to meet the needs for September 30, 1976?

b) Will this school have excess space for September 30, 1976?

c) What alternatives regarding utilization or disposition of excess space are possible?

RECENT PHOTOGRAPH

Please attach a recent photograph of the school.

If a photograph is not conveniently available, please do not delay the return of the questionnaire. If a photograph can be obtained by August 31st, please send it separately.

DEFINITIONS

Terms of Referring to Area

a) Gross Area

The gross area shall be all that area within the outside faces of enclosing walls.

Synonymous terms: Gross Areas
Gross Square Feet

b) Functional Area

Functional area shall be the sum of the areas of all classrooms, corridors, offices, washrooms, etc., measured to the inside faces of walls and partitions, including cabinets in the measured area. Such areas shall not be considered as including crawl, duct, or attic areas, nor shall mezzanine space of any height be considered for any purpose even if enclosed.

Synonymous terms: Functional Areas
Functional Space

c) Instructional Areas

Instructional areas shall include all functional areas of classrooms (including Early Childhood Services rooms, opportunity rooms, and business education rooms), science classrooms and laboratories, libraries, gymnasiums, industrial arts labs, home economics centres, ancillary classrooms, lunch-study areas, lunch-ancillary areas, vocational shops and labs, and shall include storage areas directly related thereto.

Synonymous terms: Instructional Areas
Instructional Space

d) Non-Instructional Areas

Non-instructional areas shall include all functional areas not classified as instructional such as storage rooms, gym, storage, kitchens (not as part of lunch or staff facilities), infirmaries, enclosed porches, corridors, washrooms, offices, heating and fuel storage rooms, showers and dressing rooms, administrative and staff rooms, and the walls, partitions and duct spaces of the school.

Synonymous terms: Non-instructional Areas
Non-instructional Space

September 1976

ALBERTA EDUCATION
SCHOOL SURVEY ANALYSIS

A. Approximate number of schools in the Province: 1,275

B. Number of questionnaires returned: 145 out of 225

Breakdown:			
1. Large Urban:	Calgary/Edmonton		(61 - 42%)
2. Other:	Lethbridge Medicine Hat Red Deer Grande Prairie Lloydminster Drumheller Wetaskiwin Camrose Fort McMurray St. Albert Sherwood Park	}	(21 - 15%)
3. Rural			(63 - 43%)

C. Summary of Information Reported

1. Age Distribution of the buildings

Large Urban - 21.3 years (60 reporting)
Other Urban - 19.7 years (19 reporting)
Rural - 21.3 years (54 reporting)

Breakdown according to age:

0 - 5 years old	10.5%
6 -10 years old	9.8%
10 -15 years old	13.5%
15 -20 years old	22.6%
20 -25 years old	23.3%
25 -30 years old	6.8%
over 30	13.5%

2. Type of Construction

	Large Urban	Other Urban	Rural	Overall
Brick	36 (43%)	10 (42%)	18 (23%)	64 (34%)
Frame	21 (25%)	8 (33%)	36 (45%)	65 (35%)
Concrete	10 (12%)	6 (25%)	22 (28%)	38 (20%)
Other	17 (20%)		3 (4%)	20 (11%)
				187 reporting

3. Portable classrooms:

Percent of schools with portables

		How Many Portables	Average/* School
Large Urban	26%	48 (58%)	3.00
Urban	10%	10 (12%)	5.00
Rural	16%	25 (30%)	2.50
Overall	19.3%	83 (100%)	2.96

*Only the schools, which use portables

4. Appraised value of school buildings (land and buildings)

Average Appraised Value Per School			
$ 1,488,000	Large Urban	86,279,000	(1 not reporting)
1,355,000	Other Urban	21,682,000	(5 not reporting)
855,000	Rural	48,761,000	(6 not reporting)
1,201,000	Overall	$159,722,000	(12 not reporting)

% reporting: 92

5. Total outstanding value of debentures

Average Per School Reporting			
$ 247,000	Large Urban (excluding Edmonton Public School Board	$ 9,661,000 (39 reporting)	
$ 204,000	Other Urban	$ 4,284,000 (21 reporting)	- Fort McMurray
$ 130,000	Rural	$ 8,183,000 (63 reporting)	1/4 of that
	Overall	$22,128,000	

6. Distribution of areas by school site

	Number Reporting	Acreage Total	Average	Land/Students
Large Urban	59	384 acres	6.51 acres	0.0156
Other Urban	17	114 acres	6.70 acres	0.0188
Rural	59	531 acres	9.00 acres	0.0607
Overall	135	1,029 acres	8.23 acres	0.0235

Breakdown according to use:

	Number	Percentage
1.0 - 2.5 acres	16	12%
2.5 - 5.0 acres	35	26%
5.0 - 7.5 acres	22	16%
7.5 - 10.0 acres	27	20%
10.5 - 12.5 acres	11	8%
12.5 - 15.0 acres	12	9%
15.0 - 17.5 acres	4	3%
over 17.5 acres	7	5%

(11 not reporting)

7. Satisfaction with equipment (facilities)

1. poor 2. average 3. excellent

	Large Urban Class 1		Other Urban Class 2		Rural Class 3		Overall	
	Aver.	Rep.	Aver.	Rep.	Aver.	Rep.	Aver.	Rep.
Early Childhood Services	3.00	10	2.33	6	2.08	12	2.46	26
Standard Classroom	2.03	39	2.16	19	2.03	62	2.05	120
Science Experience Rooms	2.77	13	1.85	13	1.93	43	2.07	69
Industrial Arts	1.85	13	spl too sm.	2	1.92	13	1.89	28
Home Economics	2.42	12	11.	3	2.18	11	2.27	26
Library	1.72	36	2.25	12	1.91	46	1.88	98
Gym	2.13	38	2.08	13	2.14	49	2.13	100

8. Ratio of students to instructional area:

Large Urban - Edmonton Public School Board
39 reporting - Average 74.4 square feet/student
Other Urban - 17 reporting - average 74.7 square feet/student
Rural - 57 reporting - Average 70.7 square feet/student
Overall - 113 reporting - Average 73.0 square feet/student

9. Students transported (75-76):

	Number	Enrollments	% Transported
Large Urban	4,690	24,840	19%
Other Urban	3,360	6,783	49%
Rural	4,017	13,489	30%
Overall	12,067	45,112	27%

10. --

11. Hours of use by members of the community:

	Large Urban	Small Urban	Rural	Overall
0	28%	15%	17%	21%
0 - 2.5	16%	9%	9%	12%
2.5 - 5.0	10%	14%	10%	10%
5.0 - 7.5	3%	28%	14%	12%
7.5 - 10.0	1%	10%	14%	8%
10.0 - 15.0	7%	10%	14%	10%
15.0 - 20.0	8%	5%	6%	7%
20.0 - 25.0	8%	--	5%	6%
over - 25.0	18%	10%	10%	13%
Average:	21 hours/week/school	10.5 hours	11.6 hours	15.0 hours
Number rep:	44	.8 schools	52 schools	114 schools

12. Number of people participating in community use of schools:

	Numbers	School Reporting	Number/Week/School
Large Urban	9,950	44	226
Other Urban	1,412	18	78
Rural	4,983	52	96
Overall	16,345	114	143

*Five schools reporting: 1819/1093/651/538 without those average only 116/week/school

13. Correlation of students to rooms:

Large Urban	853 rooms -	16.03 students/room
Other Urban	399 rooms -	17.00 students/room
Rural	900 rooms -	15.77 students/room
Overall	2,152 rooms -	15.77 students/room

14. Trends in student population (only schools included who reported for four successive years):

	73/74	74/75	75/76	76/77 (est.)
Large Urban	23,423	23,582	23,612	22,473
Other Urban	5,516	5,660	5,612	5,898
Rural	11,189	11,497	11,556	11,895
Overall	40,128	40,739	40,859	40,266

15. Percentage of schools with excess capacity in 76/77:

Large Urban	47%
Other Urban	14%
Rural	27%
Overall	34%

B. QUALITATIVE NEEDS - SCHOOL BUILDING STANDARDS

1. Space Allocation

Appendix III contains a comparison of Alberta's school building space standards with those of other Canadian provinces. A summary of the pupil space allocations generally being used across the country is shown in Table 6 following.

TABLE 6

SUMMARY OF PUPIL SPACE ALLOCATIONS IN CANADA

		Elementary (sq.ft.)	Secondary (sq.ft.)
Standard Classroom		720-800	720-800
Science Lab.	Min.	700	900
	Max.	1,000	2,400
Ancillary	Min.	750-800	700
	Max.	1,000-1,500	1,500
Library/Resource Centre		900-4,200	900-6,000
	or	3.5 to 5 ft.^{2}/pupil or	3.5 to 5 ft.^{2}/pupil
Gymnasium	Min.	1,500-4,000	2,800-4,800
	Max.	4,000-7,680	5,600-14,000
Industrial Arts	Min.	N/A	1,200-2,800
	Max.	N/A	1,500-4,800
Home Economics	Min.	N/A	1,000-1,600
	Max.	N/A	1,200-3,000

This survey shows that Alberta's space standards compare favourably with those of the other Provinces and, on the basis of this comparison, we therefore see no need for amending these standards.

The space allocations reported by the survey participants from within Alberta also did not reveal any significant disparities within the Province. A summary of the survey response regarding space is shown in Table 7 following.

TABLE 7

SPACE ALLOCATIONS REPORTED WITHIN ALBERTA

	Edmonton/ Calgary	Smaller Urban Boards	Rural Boards
Area of Site - acres	6.51	6.70	9.00
Pupil Loadings/Classroom	16.03	17.00	14.98
Instructional Area/Student - Square Feet	74.4	74.7	70.7

2. Environment

Environmental standards can be specified in terms of the amount of lighting in foot-candles (f.c.), the temperature settings, the relative humidity, and the number of air changes per hour or cubic feet per minute (cfm) of outside air in each area of the school. In order to compare Alberta's environmental standards with those of other provinces, personal or telephone interviews were conducted with representatives of the Department (or Ministry) of Education in each province. Notes taken during these interviews are summarized in Appendix IV under the following headings:

Province
Contact
General Policy
Lighting
Heating, Ventilating,
  Air Conditioning (HVAC)
Energy Conservation

Architects generally follow the guidelines published by IES (Illumination Engineering Society) and ASHRAE (American Society of Heating, Refrigerating, and Air Conditioning Engineers) respectively. Some provinces, such as Newfoundland, Prince Edward Island, Quebec, and British Colombia, have published manuals which include specific guidelines for the architects. In some cases, these guidelines deviate slightly from the ASHRAE and IES recommended standards.

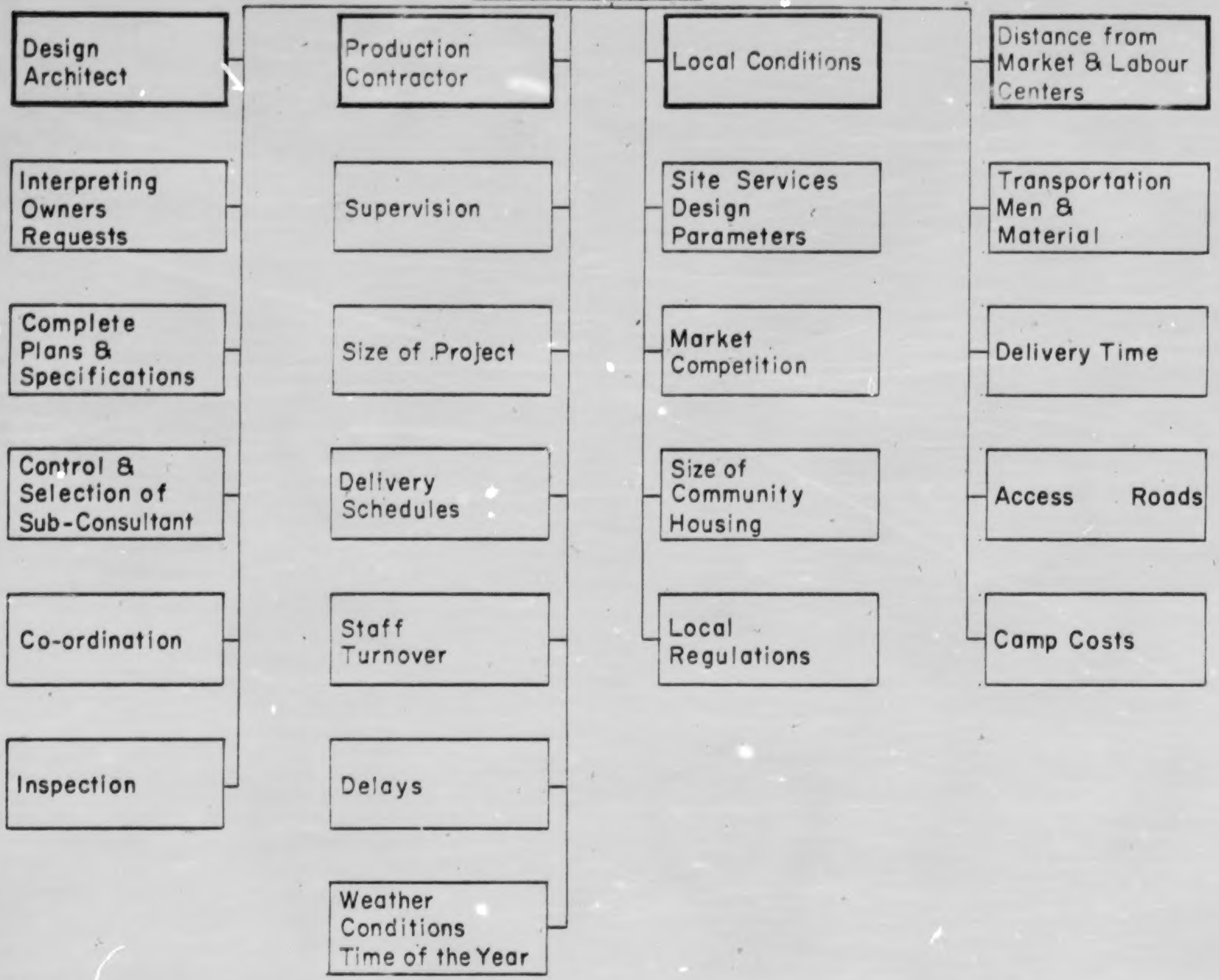
Architects are also required to comply with provincial building codes, the National Building Code, and the Canadian Electrical Code.

The 'energy crisis' has resulted in an awareness that measures must be taken to conserve our limited energy resources. Certain provinces have issued guidelines to their School Boards outlining operational improvements which can be undertaken at minimal cost. These operational improvements include such suggestions as setting back thermostat controls for night-time operation and turning off lights in empty rooms. For example, the Ontario Ministry of Education has issued a booklet, "Energy Conservation for Schools", which includes operation and maintenance checklists (see Appendix V).

Modernization programs related to energy conservation have been limited to the upgrading of thermal insulation, where practical. Most provinces are attempting to upgrade existing school facilities to their current standards, and generally cannot afford to implement costly energy-conserving techniques.

EXHIBIT E

SCHOOL CONSTRUCTION COST
(VARIABLES)



- **Design Architect**
  - Interpreting Owners Requests
  - Complete Plans & Specifications
  - Control & Selection of Sub-Consultant
  - Co-ordination
  - Inspection
- **Production Contractor**
  - Supervision
  - Size of Project
  - Delivery Schedules
  - Staff Turnover
  - Delays
  - Weather Conditions Time of the Year
- **Local Conditions**
  - Site Services Design Parameters
  - Market Competition
  - Size of Community Housing
  - Local Regulations
- **Distance from Market & Labour Centers**
  - Transportation Men & Material
  - Delivery Time
  - Access Roads
  - Camp Costs

Double-glazing of glass areas and maximum thermal insulation are standard requirements for all new school construction in most provinces.

Overall, we found that Alberta's environmental standards also compare very favourably with those of other Canadian provinces and, accordingly, we do not recommend any changes to those standards at this time.

3. Construction Costs Variations

In a province as large as Alberta with areas of sparse population, there is bound to be a considerable cost variation throughout the province for equivalent school facilities. Any statement that proposes to offer payments in excess "base rates" must be augmented by the other variables which must be considered in the total cost projection.

The Cost Factors

The four major factors which determine the cost of school construction are shown in Exhibit E opposite and listed below in decreasing order of cost control.

The Architect

The architect can influence the price (our survey indicated as much as 30%) by his interpretation of the owner's requirements. The obvious areas are such items as gross to net ratios, architectural finishes, both indoor and exterior, the number and location of bearing walls and so on. He can also influence the cost by the type of plans and specifications which are prepared. Complete plans will reduce the guessing that the contractor's estimators must make; closed or very high quality specifications reduce the choices that the contractor may make in attempting to reduce the cost.

The choice of sub-consultants, structural, mechanical, electrical and their coordination, again can cause large price variations. The architect must ensure close coordination by all professionals and design the project in such a manner that the various sub-trades can be easily coordinated. Finally, the contractor's price which will be submitted, depends upon the experience and the fairness of the inspection authorities. Very often the inspector, under orders from the architect, will insist on the contractor performing beyond the extent and meaning of the plans and specifications, and this will result in change orders and cost increases.

The Contractor

In most cases, schools in Alberta have been built by competitive bid. The general contractor collects a series of prices from his subcontractors and suppliers, determines his own costs and anticipated profits and prepares his bid. This cost, and those of his subcontractors are influenced by a number of items. Probably the most significant, from the contractor's viewpoint, is the project supervisor who will be in charge of the production. The skill and the ability of this man very often determines the extent of profit or loss. The contractor will examine the size of the project, and generally speaking, the larger the project the smaller will be the unit cost, because there are a number of fixed costs which the contractor must bear, both on small and large projects.

The availability and delivery of materials at the time of construction is a concern of the contractor. During periods of "tight market" he may be subject to delays in the construction, while many of his fixed costs continue to accumulate. The extent and significance of staff turnover has a direct bearing on the final cost figure. The combination of poor job management and remoteness of site may cause a large employee turnover. Contractors are continually concerned about the costs beyond their control. Approval of shop drawings, availability of drawings during tender periods, and promptness of inspection are all items that cause concern to the contractor and consequently influence his price.

Local Conditions

The local conditions and deviant local regulations can substantially alter construction costs. The soil constructions of the actual site very often determine the type of building foundation, and this in turn may cause a significant variation in the building proper. The topography of the site can necessitate considerable earth moving costs. The specific site services required and availability of these services contribute significantly to the overall costs. The competitive situation in a particular locale, for both material and labour, will be an influence. The increased cost in Ft. McMurray due to the construction of the Syncrude Plant is a case in point.

A large community with ample housing for the construction forces will tend to keep costs at the "base level". A large project in a small community will have an adverse effect. Although the province of Alberta enjoys a uniform code, local jurisdictions may override the generally accepted norm. On occasion, the fire fighting authorities will insist on additional features which they deem are necessary, or less frequently, insist on observations of standards which were clearly not intended for the local condition. Municipal authorities, through their own zoning and development regulations, can also generate cost increases.

The Distance Factor

In establishing a cost factor which can be applied to those areas some distance from the Edmonton-Calgary-Lethbridge zone, the transportation costs of men and materials must be added to the base price. Distances can be computed fairly easily (on a straight line basis) using maps of the province, and concentric circles can then be drawn around the distribution centres to indicate relative cost factors. However, the actual cost will be determined by the route, the delivery time, and the presence of access roads to the individual site. In addition to the transportation problem, on occasion, the travel time increment justifies the establishment of a self-contained camp to provide food and lodging for the construction forces. This can cause an increment beyond the normal transportation costs.

In order to establish the construction cost variations throughout Alberta, current prices on a number of specific items, such as concrete blocks, labour rates and freight rates were obtained from contractors, transportation companies and municipal authorities. These factors were used in conjunction with cost data submitted from the construction fraternity, and the cost maps shown in Appendix VI were prepared. Also included in the data are the design parameters which must be included in any cost increase due to increased heating facilities due to lower ambient design temperatures, and increased structural costs due to heavier snow loadings in certain areas of the province.

Again, due to the large number of variables which are present in all construction projects, the degree of accuracy is limited to five percent and this is reflected in the range data. Cost differentials have been studied by other authorities, such as the Central Mortgage and Housing Corporation, and there appears to be fairly close agreement to the data submitted herein.

Construction cost variations do exist to a significant degree in various parts of the Province and it is therefore important that Provincial support levels, to be equitable, be indexed to compensate for these variations.

SCHOOL BUILDING STANDARDS
ELEMENTARY SCHOOL

		British Columbia	Alberta	Saskatchewan	Manitoba	Ontario	New Brunswick	Nova Scotia	Prince Edward Island	Newfoundland
Area of Site (Acres)		100 pupils = 3 acres +1 acre/100 pupils		No Standards	4 - 5		2 - 3	5	10+1/100 pupils	100 pupils = 3 acres + 1 acre/ 50 - 100 pupils
Size of School	- min.			no min.	240	210	300	300	360	300
	- max.	No Standard		500 - 800	600	375	500	600	600	500
Pupil Loadings/Classroom		30	25	25	k=25-28	k=35-40	30	30	27	35
Utilization o/u		-		-		90%	none	none	75-80%	
Density of School -		-								
Gross sq. ft./student		do not use	100	85 - 95	do not use		80	do not use	88 - 104	70 - 85
Net sq. ft./student										
Classroom/Other Space		do not use	65/35	-	60/40		60/40	60/40		65/35
Square Feet/Classroom(1)										
Kindergarten	min.	900		750		700				900
	max.	1,000		1,000		1,200	none	750	none	
Standard classroom	min.	(3)	750	750	750	750	750	750	800	700
	max.									
Science lab.	min.	(3)	+250		1,000	700	900	900		700
	max.					850				
Ancillary rooms(2)	min.	(3)	750	UNDER DISCUSSION		800		750		750
	max.		1,000			1,400	1,000	1,500		1,000
Industrial arts	min.	(3)			2,100	1,300				
	max.				2,800	2,500				
Home economics	min.	(3)			1,600	1,100				
	max.				2,800	1,300				
Library/resource centre	min.	(3)	900		3.5 ft.^{2}/ pupil	1,000	3.5 - 4.5	1,000		900
	max.		4,000			5 ft.^{2}/ pupil	ft.^{2}/pupil	3,900	4,200	3 ft.^{2}/pupil
Gymnasium/general purpose	min.	3652 (<300 pupils)	2,400		2,800	1,500	2,400	3,150	4,000	2,800
	max.	5202 (>300 pupils)	7,680		6,000	6,300	4,000	4,000	5,200	4,800

NOTES:
(1) Square footages do not include storage or preparation space.
(2) Rooms for art, music, drama, language, etc.
(3) Based on 30 ft.^{2} per pupil

SCHOOL BUILDING STANDARDS
JUNIOR HIGH SCHOOL

		British Columbia	Alberta	Saskatchewan	Manitoba	Ontario	New Brunswick	Nova Scotia	Prince Edward Island	Newfoundland
Area of Site (Acres)		100 pupils = 5 acres +2 acres/300 pupils (>1600 pupils = 1 acre/100 pupils)		No Standards	4 - 5		5 - 10	7	20+1/100	100 pupils = 5 acres + 1 acre/100 pupils
Size of School - min.		No Standard		none	240	350	300	300	400	210
- max.				1,000+	990	700	500	1,200	1,000	1,000
Pupil Loadings/Classroom		20 - 30	25	25	23 - 25	35	30	30	27	35
Utilization o/u						90%				
Density of School -										
Gross sq. ft./student		do not use	100	120	do not use		90	do not use	136	90
Net sq. ft./student										
Classroom/Other Space		do not use	60/35	-			60/40	60/30	-	65/35
Square Feet/Classroom(1)										
Standard classroom	min.	600 - 900	750	750	750	750	720	750	800	700
	max.									
Science lab.	min.	600 - 900	1,300		1,000	900	1,200	1,200	1,300	1,250
	max.					1,200		2,400		
Ancillary rooms(2)	min.	1,000	1,000		1,000	900		750	1,300	1,000
	max.	3,025				1,500	1,000	1,500		
Industrial art	min.	2,375	2,800	UNDER DISCUSSION	2,100	1,300	2,800	1,200		3,200
	max.	6,700	4,000		2,800	2,800	3,300	1,500	4,800	
Home economics	min.	1,800	1,000		1,600	1,200	2,500	1,200	1,100	
	max.	8,400	1,400		2,800	1,300	3,000	1,500	1,200	[illegible],600
Library/resource centre	min.	970	900		3.5 ft.^{2}/pupil	1,000	4-4.5 ft.^{2}/pupil	3,150	3,250	1,500
	max.	27 ft.^{2}/pupil or 2.5 ft.^{2} x max. capacity	4,900			5,599		7,000	4,000	5 ft.^{2}/pupil
Gymnasium/general purpose	min.	4,700	4,000		4,000	2,800	4,000	1,000		4,800
	max.	11,500 + bleachers	14,400		7,000	6,300	8,800	6,000	7,400	[illegible],600

NOTES: (1) Square footages do not include storage or preparation space.
(2) Rooms for art, music, drama, language, etc.

SCHOOL BUILDING STANDARDS
SENIOR HIGH SCHOOL

		British Columbia	Alberta	Saskatchewan	Manitoba	Ontario	New Brunswick	Nova Scotia	Prince Edward Island	Newfoundland
Area of Site (Acres)		100 pupils = 5 acres +2 acres/300 pupils (>1600 pupils = 1 acre/100 pupils)		-	4 - 5	4 - 12	5 - 10	10	20+1/100	100 pupils = 5 acres + 1 acre/ 100 pupils
Size of School - min.		No Standard		-	240		500	300	400	210
- max.				1,000+	1,500	1,500				
Pupil Loadings/Classroom		20 - 30	25	25	23 - 25	30	academic=30 vocational=16	30		35
Utilization o/u						90%				
Density of School -										
Gross sq. ft./student		do not use	100	120			90 - 120	do not use		100
Net sq. ft./student										
Classroom/Other Space		do not use	60/35		60/40		60/40	60/30		65/35
Square Feet/Classroom(1)										
Standard Classroom	**min.**	600 - 900	750	750		750	750		800	
	max.									
Science lab.	**min.**	600 - 900	1,300	SAME AS JUNIOR HIGH	SAME AS JUNIOR HIGH	950	1,000	SAME AS JUNIOR HIGH	1,200	SAME AS JUNIOR HIGH
	max.					1,400	1,200			
Ancillary rooms(2)	**min.**	1,000	1,000			900	1,000		1,200	
	max.	3,025				1,500	1,400		1,300	
Industrial art	**min.**	4,050	3,200			1,500	DEPENDS ON STUDENT ENROLLMENT			
	max.	9,675	8,000			3,400			4,800	
Home economics	**min.**	1,800	1,000			1,100			1,100	
	max.	8,400	1,400			1,350			1,200	
Library/resource centre	**min.**	970	1,500			1,500	4-4.5 ft.^{2}/ pupil		3,250	6,000
	max.	27 ft.^{2}/pupil or 2.5 ft.^{2} x max. capacity	4,900	-		5,599			4,000	7,000
Gymnasium/general purpose	**min.**	5,645	5,040		4,800	3,150	4,400			
	max.	13,655 + bleachers	14,400		12,000	8,000	8,800		8,000	

NOTES: (1) Square footages do not include storage or preparation space.
(2) Rooms for art, music, drama, language, etc.

ENVIRONMENTAL STANDARDS BY PROVINCE

APPENDIX IV

Province	Contact	General Policy	Lighting			HVAC		Energy Conservation			Provincial Regulatory Body- Energy Conservation
			Interior	Natural	Exterior	Heating/Air Conditioning	Ventilating Air	Operational Improvements	Modernization	New Construction	
1. Newfoundland	G. Adams Engineer School Construction Ministry of Education	- Standard are included in School Planning manual (1973), now under revision	Art rooms, classrooms, library, lecture halls, home economics room - 70 f.c. laboratories, drafting rooms, shops - 100 f.c. Gymnasium, auditorium - 30 f.c. Corridors, washrooms 20 f.c. Sewing room, supplementary lighting - 150 f.c. (ASHRAE standards)	- No formal standards	- No standards	- Architects generally follow ASHRAE standards - Ministry does not set down temperature setting or humidity guidelines - There is no air conditioning in Nfld. Schools - Most new schools are electrically heated due to lower maintenance costs and availability of electricity. No power cutbacks experienced to date	- ASHRAE standards used as guideline for natural or mechanical systems - Ministry encourages natural ventilation only for rooms with exterior walls	- School Boards control operational budgets and are expected to take initiative to reduce costs	- Ministry & School Boards at this time are most concerned with upgrading schools to eliminate fire hazards - Maintenance and repairs are responsibility of School Boards - Plans for extensions are reviewed by Ministry	- School Planning manual is being revised to make gymnasium and home economic areas smaller; environmental standards will remain the same	- Contact was not aware of such a body
2. Nova Scotia	a. Mr. Higden Ministry of Education	- Dept. of Public Works reviews all plans with respect to environmental standards.						- School Boards set operational standards. - Ministry has not forwarded any advice to School Boards to date.	- School Boards apply for cost-sharing grants; if cost of project is over $60,000, DPW review and architect are required.	- General policy is to discourage electrical heating.	
	b. Mr. Baker Director of Planning Dept. of Public Works	- National Building Code is used, since there is no Provincial Building Code	- IES standards are followed	- No standards, Building Code does not require windows for schools	- IES standards are followed	- ASHRAE standards are followed.	- ASHRAE standards are followed	- Dept. of Public Works has made recommendations to Ministry of Education re: - turning off lights at night and on weekends - reducing ventilation on weekends.	- Dept. of Public Works has recommended that controls be instituted to reduce the amount of outside ventilating air during cold periods. - Where practical, DPW recommend increasing the amount of thermal insulation	- Modification of the IES and ASHRAE standards for energy conservation is under consideration	- Contact was not aware of such a body. DPW are working on their own recommendations
3. New Brunswick	R. Leblanc Architectural Technician Ministry of Education	- Manual outlining environmental standards not available	- Dept. of Labour Code stipulates certain lighting levels. Ministry has issued proposal recommending that these levels be lowered. Proposal suggests the use of localized lighting and that levels be determined by type of task, e.g. classrooms and gymnasiums - standard is now 100 f.c.; proposal recommends 70 f.c.	- No formal standards (informally), there are windows in most classrooms	- No standards	- Temperature settings are in the range 68-74°F - Air conditioning is installed in large theatres only with community financing - If costs are comparable, will recommend electrical heating due to lower maintenance costs	- Six (6) changes per hour is the standard for classrooms	- Ministry has issued basic guidelines to School Boards.	- Where practical, thermal insulation is increased. - Lighting design is brought up to present day standards. - School Boards are responsible for repairs, e.g. replacement with double-glazed glass is their perogative	- New schools have double-glazed glass and maximum thermal insulation	- Contact was not aware of such a board
4. Prince Edward Island	B. Ewing School Construction - Project Manager Ministry of Education	- Standards are included in the School Design and Facilities manual (1972); now under revision	Classrooms, libraries, art rooms, offices, teacher rooms - 70 f.c. Shops, laboratories - 100 f.c. Gymnasiums, washrooms, activity rooms, cafeterias, locker rooms - 30 f.c. Corridors - 20 f.c. - Separate switch for exterior row of lights is required	- No formal standard attempt to have at least one window per classroom	- No standards	- Systems designed for classrooms at 70°F and corridors at 65°F - No air conditioning in any schools	- Design criteria: a) classrooms - 15 cfm of outside air per student b) gyms, auditoriums - 20 cfm per designed occupancy (includes 10 cfm of outside air) c) office, staff rooms - 6 air changes per hour.	- Ministry has met with five (5) School Boards and given encouragement in this area. - Ministry compared lighting levels in every school with minimum standard. - School Boards are encouraged to reduce room temperatures to 68°F	- No specific plan has been developed, most construction projects are new schools. - School Boards are responsible for repairs, e.g. repair of windows	- Thermal insulation standard is 2" to 3" in walls and 4" in roof - Tender for one new school includes the requirement for a solar panel and a windmill to provide domestic heating	- Dept. of Public Works is responsible for setting up a unit to advise government depts. on energy conservation

			Lighting			HVAC		Energy Conservation			Provincial Regulatory Body-
Province	Contact	General Policy	Interior	Natural	Exterior	Heating/Air Conditioning	Ventilating Air	Operational Improvements	Modernization	New Construction	Energy Conservation
5. Quebec	J.L. Giroux General Manager Dept. of Lands & Buildings.	- Standards are set are set by the Ministry.	Classrooms - 70 f.c. Gymnasium, cafeteria - 70 f.c. Corridors - 30 f.c.	- No formal standards - Recommend only 15% of exterior wall area be used as window due to high heating losses.	- No standards	- Electrical heating is encouraged for new schools due to availability. - Trend is away from air conditioning; more use of open windows. - Humidity standards: 30% in winter 50% in summer - Thermal insulation standard since 1964 is U factor less than 0.1	- Standard is 6 changes per hour in every room. - Requirement for 15% outside air varies with time and outside temperature; automatic controls used.	- Each School Board is responsible for developing its own operational standards; Ministry has not yet given any advice. Ministry has developed a preventive maintenance program, particularly for air conditioning equipment. - Recommendation has been made that temperature be lowered from 70°F to 65°F at night and on weekends. - In order to stay within electrical power peak load design, temperature is automatically reduced from 70°F to 69°F in some schools.	- No plan at this time for updating schools with respect to ventilation, insulation and lighting design.	- Standards have not been changed as result of 'energy crisis'.	- Dept. of Natural Resources (Y. Turcotte) is responsible for advising government department on energy conservation.
6. Saskatchewan	N. McCulloch Ministry of Education	- No guidelines at this time; now being prepared. - Ministry does not review architect's plans with respect to environmental standards; architect is expected to follow applicable Provincial codes.	No standards; design is architect's option.	- No standards - Recommend at least one window per classroom.	No standards; design is architect's option.	- Architect is expected to follow ASHRAE guidelines.	- No standards specified. - In many older schools, there is no mechanical ventilation.	- No guidelines have been given to School Boards to date. - Ministry hopes to: 1. set up seminars for school administrators. 2. develop guidelines on energy conservation.	- No plan at this time, although Boards are encouraged to reuse existing schools versus tearing them down.	- Ministry is considering the use of a computer system, Merryweather, which will review a building design in terms of annual energy requirements.	- Energy Secretariat Committee was established in 1975 and includes representatives from every department. N. McCulloch is the representative from Education.
7. British Columbia	F. Simpson Director of Facilities Development Ministry of Education	- Standards are included in the School Building Manual (1967).						- No guidelines have been issued to the School Boards; under consideration.	- No formal guidelines.	Revision of standards is under consideration.	- Contact was not aware of such a body.
8. Manitoba	D. St. Lawrence Architect Dept. of Education	- No standards are issued by the Ministry. - Plans are referred to Committee and reviewed by the Dept. Architect for compliancy with the Architect's Formula (function of no. of pupils, potential growth, escalation of material costs).	- No standards, design is architect's option.	- No standards; design is School Division's option.	- No standards.	- No standards; design is architect's option. - Informally, electrical heating is encouraged due to availability.	- No standards; design is architect's option.	- Basic guidelines were issued by the Minister some 2 to 3 years ago, e.g. turn back termostats in evenings and on weekends, turn off lights in empty rooms.	- Upgrading of older schools usually entails additional lighting. - Winnipeg Division upgraded thermal insulation in their schools on their own initiative.	- Ministry has recommended that thermal insulation be increased from 1½" to 3" where applicable. - Double-glazing of glass areas is standard.	Dept. of Public Works (B. Connell) has formed group to advise other depts. on energy conservation.
9. Ontario	Mr. Rankin Asst. Chief Architect Ministry of Education	Standards are set by School Boards - Ministry does not review electrical, mechanical design, only space and layout requirements - Educational Specifications and User Requirements (E1, E2, E3) were published (1968-1970), and include environmental criteria.	- Absolute standard of 75 f.c. is being discouraged; more consideration is being given to brightness contrast and reflectivity. - Task lighting limits future rearrangements in school.	- No standards; have abandoned old criteria of 75 sq.ft. of glass per classroom.	- No standards	- No standards; design is School Board and local architect's option. - ASHRAE and Ontario Building Code supply guidelines.	- No standards; design is School Board and local architect's option. - ASHRAE and Ontario Building Code supply guidelines.	- Ministry has issued booklets, 'Energy Conservation for Schools' (1975) which provides checklist of operational and maintenance improvements. - Ministry plans to hold seminars on preventative maintenance with operation and maintenance personnel. - Ministry has issued forms encouraging School Boards to audit their energy consumption. - Study is being carried out re reducing number of air changes per hour as recommended by ASHRAE.	- Ministry is conducting experiment in two schools on benefits of thermal insulation; results should be available in Sept. 1976.	- Ministry now requiring reasonable level of insulation in new schools - Ministry are encouraging automatic controls where applicable	- Ministry of Energy advises government on energy conservation. - Funds are provided under the Provincial Energy Program to individual departments, e.g. Ministry of Education is using funds to publish teacher guidelines, give seminars, conduct experiments, etc.

STANDARDS (taken from Mechanical and Electrical Equipment for Buildings, by W. McGuiness and B. Stein, 1971, Wiley)

1. ASHRAE (American Society of Heating, Refrigerating, and Air Conditioning Engineers)

A. Thermal Comfort Conditions

		Maximum Rate of Change
Dry Bulb Temperature	73-77°	4°F/hr.
Relative Humidity	Below 60%	20%/hr.

B. Outdoor Air Requirements

	Smoking	Cfm per Person	
		Recommended	Minimum
Schoolrooms	None	-*	-*
Department Stores	None	7-1/2	5
Theatre	None	7-1/2	5

*See local codes which may govern.

2. IES (Illumination Engineering Society)

A. Illumination Levels - Schools

	Recommended Minimum Foot Candles
Auditorium	
Assembly only	30
Study Halls	70
Classrooms	
Regular Classroom Work	70
Chalkboards (supplementary illumination)	150
Drafting Rooms	100
Laboratories	
General Work	70
Close Work	150
Lecture Rooms	70
Manual Arts	100
Sewing Rooms	150
Study Halls	70
Corridors and Stairs	20
Gymnasiums	
General Exercising	30
Exhibition Games	50

OPERATION CHECKLIST

1. Ensure that operating personnel are familiar with equipment, installations, and distribution systems.

2. Make available pertinent drawings and operating instructions to operating personnel.

3. Development schedules and instruct cleaners, guards and other workmen to turn the lights on in the morning and off at night at predetermined times.

4. Schedule control and switching off of street area, perimeter and floodlighting.

5. Determine the most economical use of snow-melting and heating cable systems in accordance with weather conditions.

6. Investigate the possibility of rescheduling operations in order to decrease the peak loads on utilities.

7. Develop a building heating schedule to allow the most economical use (i.e. the most advantageous turning "on" and "off" points) of steam, hot water and electric heating.

8. Investigate humidity systems for proper operation and adjustment.

9. Shut down motor-operated equipment whenever possible to reduce power consumption.

10. Shut down air-conditioning and ventilating systems (whenever possible) after working hours and during weekends and holidays.

11. Lower storage tank temperatures of domestic hot water heating systems to the point where the storage capacity is just sufficient to meet the occupancy requirements.

12. Check calibration of controls for air-conditioning systems and boilers to ensure the most effective performance.

13. Set back thermostat controls to 15°C (60°F) for night-time operation.

14. Place lamps to give the desired illumination at task stations and reduce lighting levels in non-essential areas.

15. Check that all plumbing fixtures are turned off when not in actual use.

16. Keep accurate records, properly tabulated and supplemented with graphs. They should include:

    - consumption of fuels, water and electricity,
    - production of steam where steam is being generated,
    - changes in operating procedures (e.g. changes in scheduling equipment shutdown, adjustments, etc.),
    - inspections,
    - modifications and improvements pertaining to energy savings and related installation costs.

    The records should show changes in energy consumption resulting from the implementation of the energy-conservation program. An evaluation of savings should be based on the annual meteorological records. A summary of fuel and electricity consumption for each year should be prepared.

17. Monitor flue gases on a regular basis to ensure optimum combination.

18. Develop specifications for new equipment to ensure that it is designed to use the minimum amount of energy within the requirements of performance, longevity and maintenance.

19. Do not buy inexpensive and inferior equipment to save money on the initial cost. More often than not, inferior equipment consumes more fuel or electricity.

20. Consider installing monitoring devices on equipment that uses large amounts of energy. The monitoring device will sound an alarm or shut down improperly maintained equipment until the malfunctions are corrected.

21. Institute an educational program for operating staff relating to the conservation of energy.

Extracted from "Energy Conservation for Schools", 1975, Ontario Ministry of Education.

MAINTENANCE CHECKLIST

1. Establish a controlled preventive maintenance program.
2. Clean lighting fixtures and replace light bulbs and fluorescent tubes regularly.
3. Consider institution of group relamping programs.
4. Check air filters of ventilation and air-conditioning systems.
5. Maintain equipment to allow operation at optimum efficiency.
6. Clean all equipment regularly.
7. Enter into maintenance contracts for specialized systems such as controls, refrigeration equipment, water treatment, etc.
8. Conduct combustion efficiency tests at regular intervals and make any necessary adjustments.
9. Weather-strip windows and door openings, caulk window and door frames, and install storm windows.
10. Provide insulation, where feasible, for roofs, walls, ceilings and floors.
11. Seal all sky-lights and other roof openings as tightly as possible to reduce the "chimney-effect".
12. Improve insulation of steam mains, risers, runouts, etc. Add insulation to all uninsulated pipe fittings, flanges and equipment.
13. Check radiation surfaces for obstructions.
14. Remove or shut off unused steam and return piping of steam, distribution systems.
15. Check hydronic systems for the proper temperature difference between supply mains and return mains.
16. Examine air distribution ducts for leaks, deterioration, separation of insulation, heat pick-up from pipes, and required insulation improvements.
17. Check insulation on refrigeration lines.
18. Install raw water make-up supply meters in boiler plants.

19. When replacing electrical fixtures, use more efficient fixtures wherever possible, taking into consideration the efficiency of lamp sources and fixture design.

20. Investigate and correct the power factor of the electrical distribution system.

21. When alterations are being made, evaluate the light reflectances of walls, floors, and ceilings to achieve more efficient light utilization.

22. Add automatic controls wherever possible to allow the most economical operation of equipment.

23. Install clocks, photo-cells, and other controls to ensure the predetermined cycle operation.

24. Revise electrical circuits to allow partial switching of electrical loads.

25. Add zone controls, day-night controls, mixing temperature controls, return controls, return-air temperature controls, etc., as required, to reduce energy consumption.

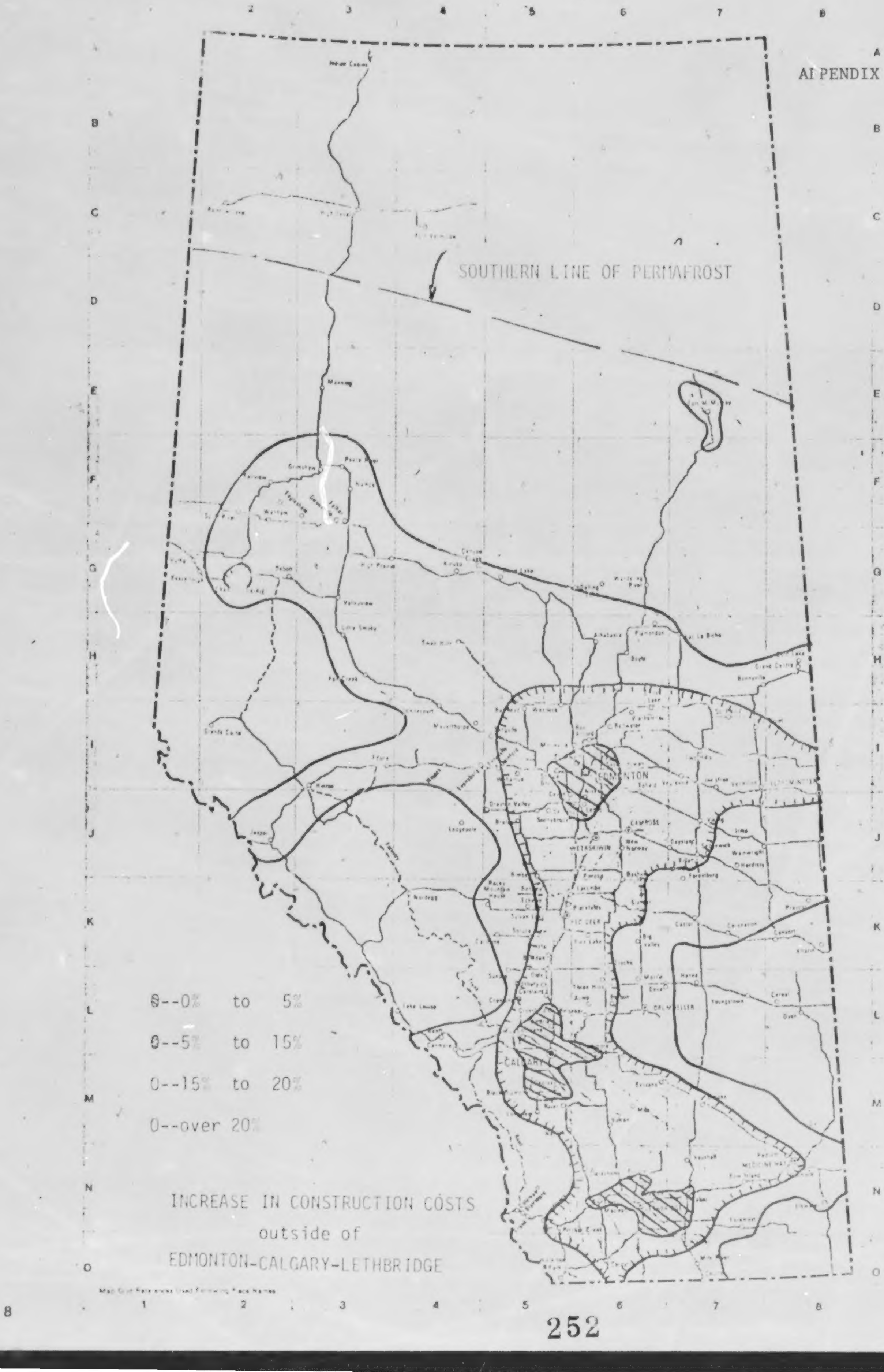
26. Investigate the feasibility of installing air-to-air and air-to-water heat-recovery equipment in systems requiring large volumes of outside air.

27. Consider having a competent combustion engineer make a flue gas analysis at least once a year to properly adjust the fuel input and to check combustion.

28. Institute educational programs relating to the conservation of energy for maintenance staff.

Extracted from "Energy Conservation for Schools", 1975, Ontario Ministry of Education.

APPENDIX VI


SOUTHERN LINE OF PERMAFROST
Manning
Grimshaw
Peace River
Valleyview
High Prairie
Swan Hill
Athabasca
Plamondon
Lac La Biche
Boyle
Cold Lake
Grand Centre
Bonnyville
Jasper
Hinton
Edson
EDMONTON
Drayton Valley
Lodgepole
CAMROSE
WETASKIWIN
New Norway
Daysland
Irma
Wainwright
Hardisty
Vegreville
Vermilion
LLOYDMINSTER
Forestburg
Ponoka
Lacombe
Rocky Mountain House
Nordegg
RED DEER
Castor
Coronation
Consort
Big Valley
Morrin
Hanna
Olds
Didsbury
Carstairs
Three Hills
DRUMHELLER
Youngstown
Cereal
Oyen
Lake Louise
Canmore
CALGARY
MEDICINE HAT
1
2
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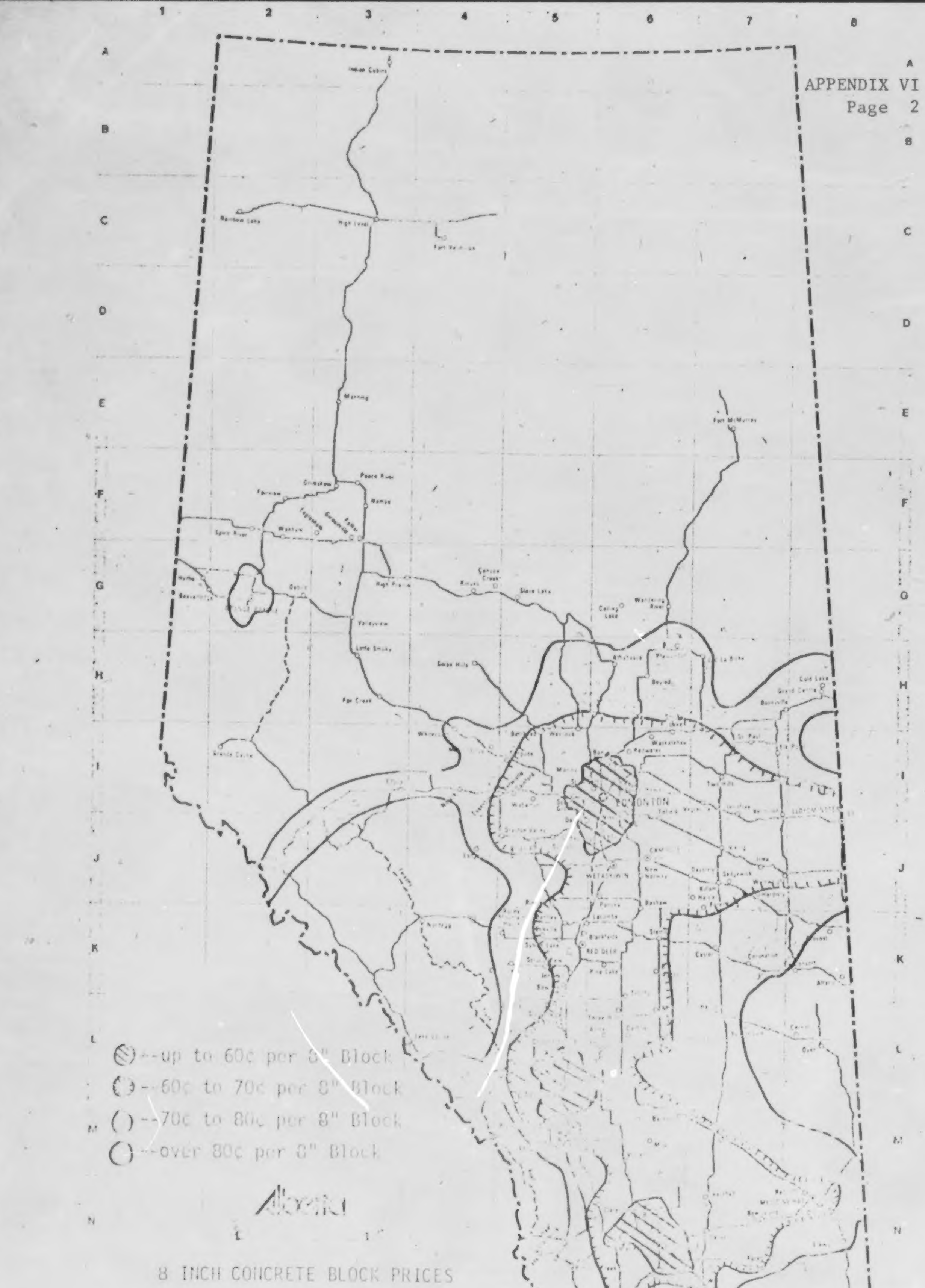
§--5% to 15%
0--15% to 20%
0--over 20%
Map Grid References Used Following Place Names

INCREASE IN CONSTRUCTION COSTS
outside of
EDMONTON-CALGARY-LETHBRIDGE


▨--up to 60¢ per 8" Block
◐--60¢ to 70¢ per 8" Block
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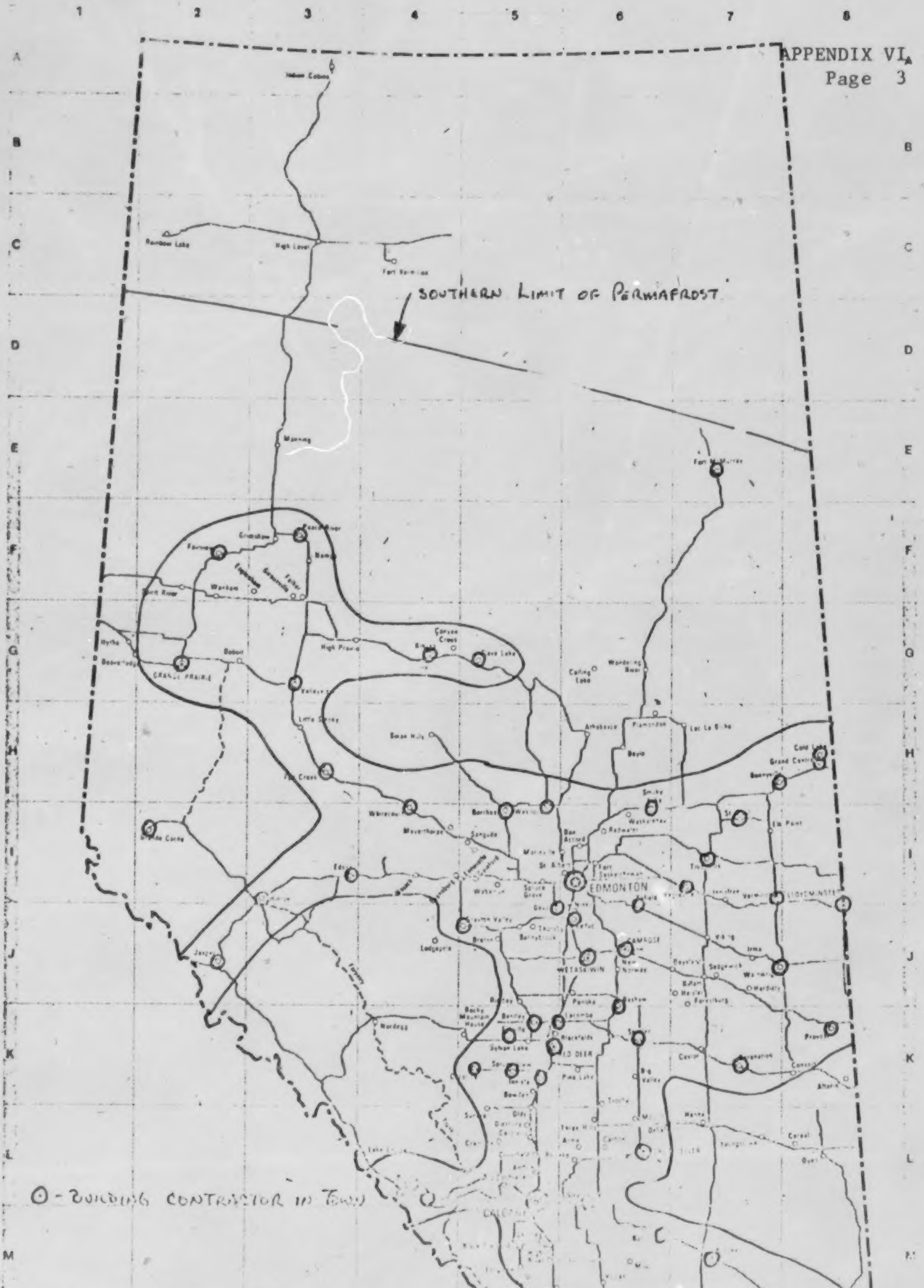
Alberta
EDMONTON
WETASKIWIN
RED DEER
Fort McMurray
Peace River
High Level
Rainbow Lake
Manning
Grimshaw
Fairview
Spirit River
High Prairie
Slave Lake
Valleyview
Little Smoky
Swan Hills
Fox Creek
Camrose
Cold Lake
Map Grid References Used Following Place Names

8 INCH CONCRETE BLOCK PRICES


SOUTHERN LIMIT OF PERMAFROST
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Peace River
Grande Prairie
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Lloydminster
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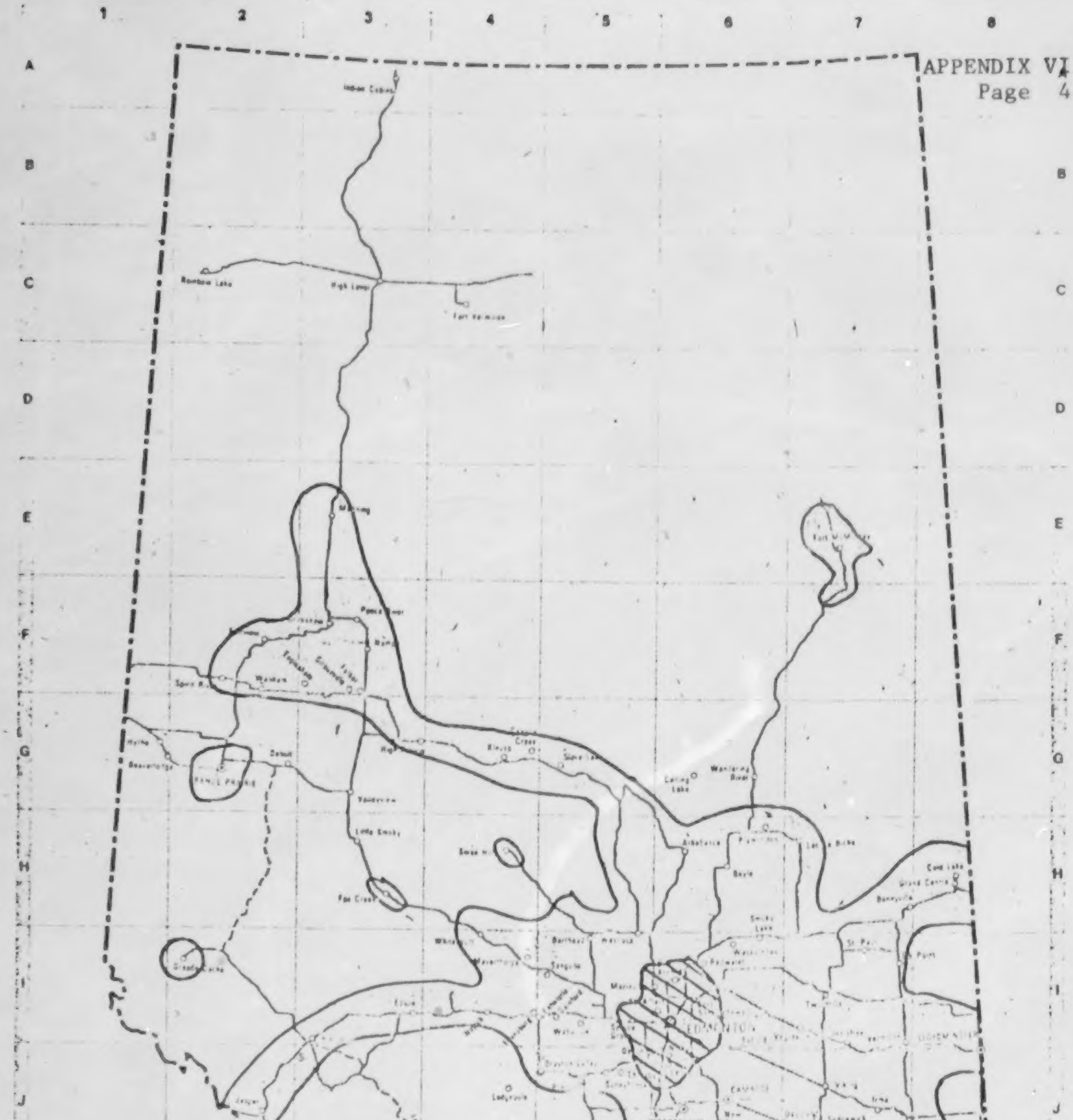
O - BUILDING CONTRACTOR IN TOWN

INDEX

TOWNS WHICH HAVE LOCAL BUILDING CONTRACTORS

Map Grid Reference Used Following Place Names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◎ --$35.00 to $45.00 per yard
○ --over $45.00 per yard
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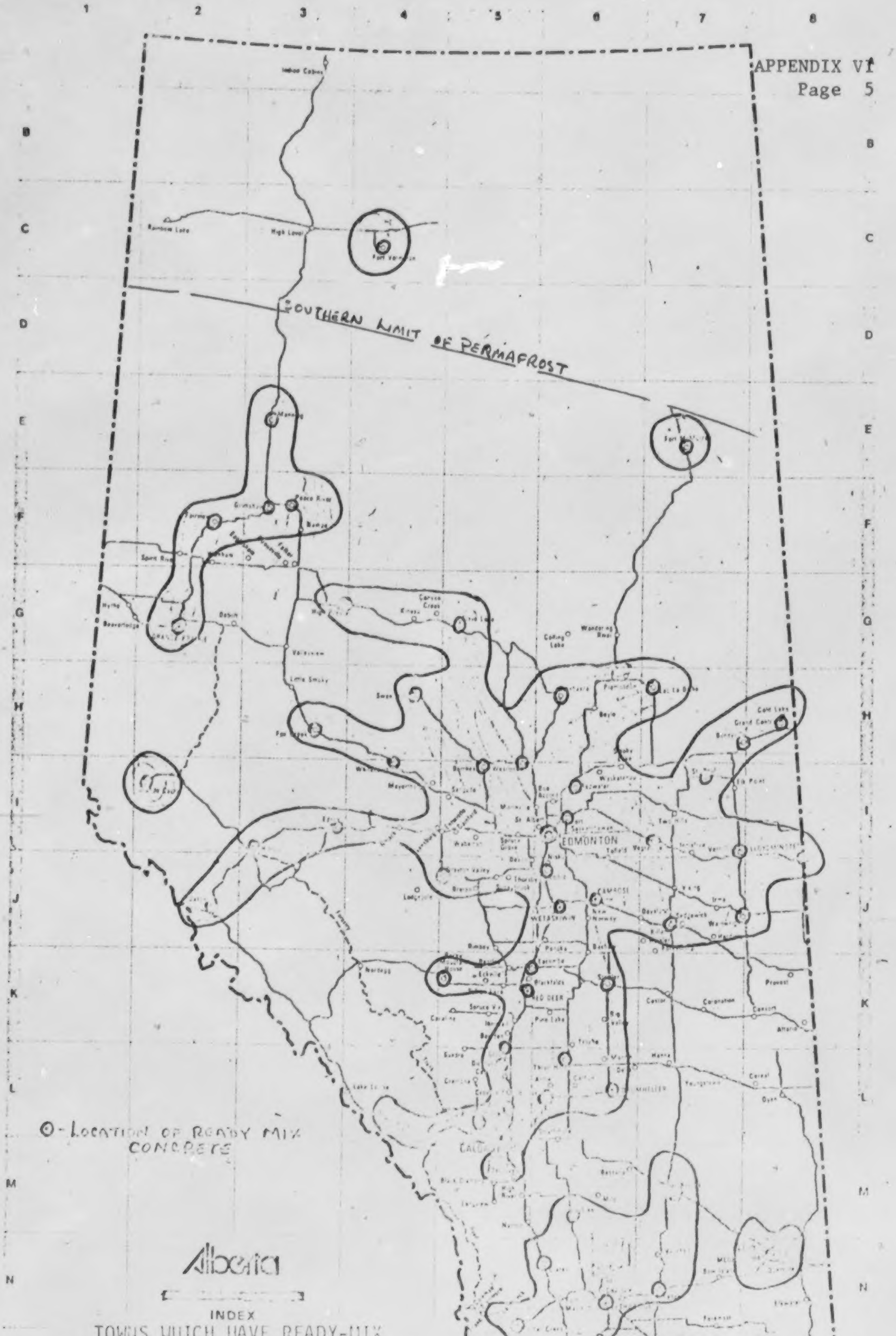
Fort Vermilion
Manning
Fort McMurray
Grande Prairie
Fox Creek
Swan Hills
Athabasca
EDMONTON
Jasper
Camrose
Wetaskiwin
Map Grid References Used Following Place Names

INDEX

CONCRETE COSTS PER YARD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Fort McMurray
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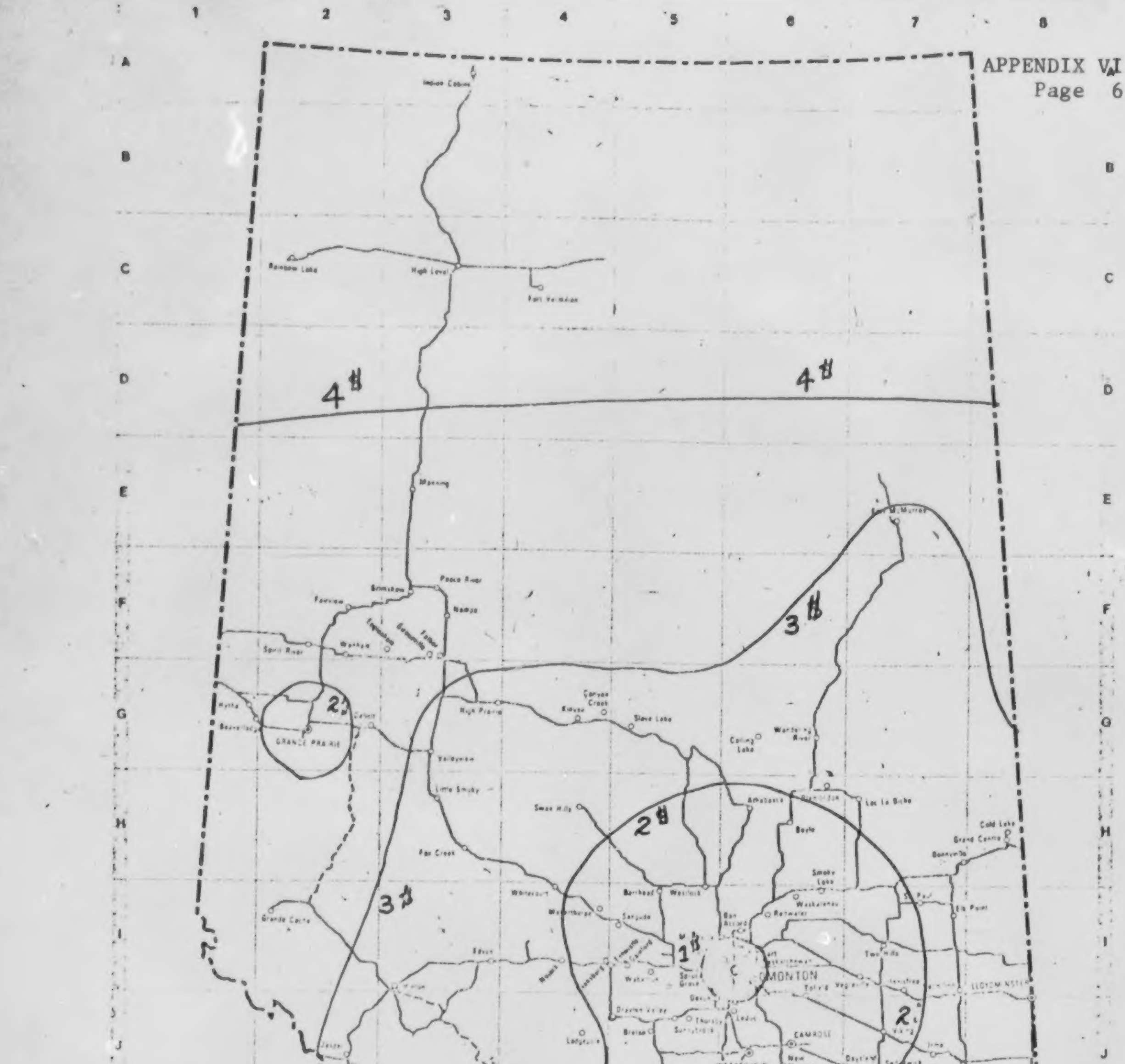
Map Grid References Used Following Place Names

INDEX
TOWNS WHICH HAVE READY-MIX
CONCRETE SUPPLY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Fox Creek
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Fort McMurray
Lac La Biche
Boyle
Cold Lake
Grand Centre
Bonnyville
St. Paul
Elk Point
Barrhead
Westlock
Edmonton
Vegreville
Lloydminster
Camrose
Wetaskiwin
Wainwright
Hinton
Jasper
Edson
Grande Cache
Drayton Valley
Red Deer
Stettler
Drumheller
Hanna
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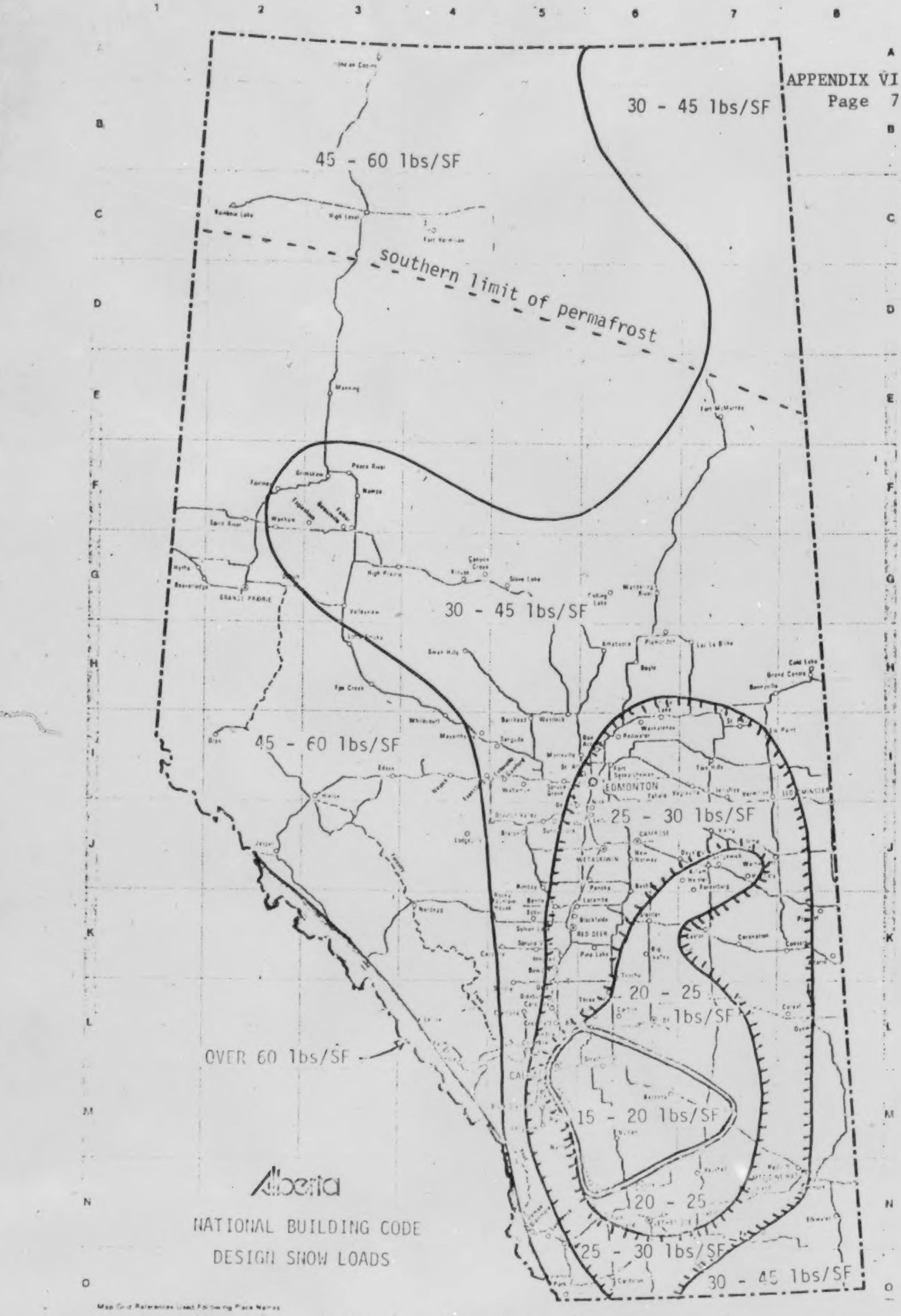
Provost
Calgary
Lake Louise
Medicine Hat
Lethbridge
Fort Macleod
Pincher Creek
Cardston
Taber
($/100 lbs.)
Alberta
INDEX

TRANSPORTATION COSTS FROM MAJOR CENTRES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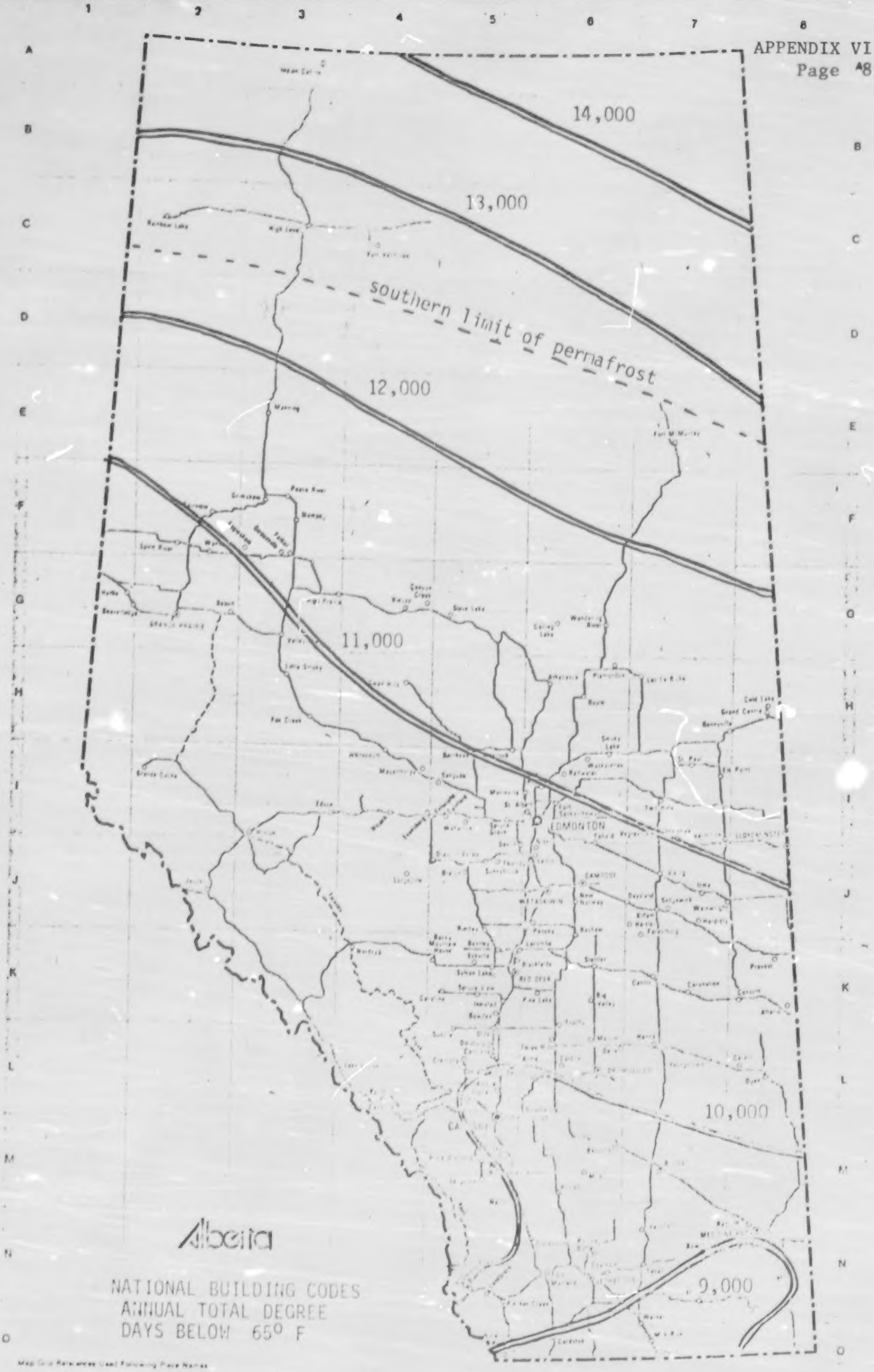
CAMROSE
WETASKIWIN
RED DEER
GRANDE PRAIRIE
20 - 25 lbs/SF
OVER 60 lbs/SF
15 - 20 lbs/SF
20 - 25
25 - 30 lbs/SF
30 - 45 lbs/SF
Alberta
Map Grid References Used Following Place Names

NATIONAL BUILDING CODE
DESIGN SNOW LOADS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Map Grid Reference Used Following Place Names

NATIONAL BUILDING CODES
ANNUAL TOTAL DEGREE
DAYS BELOW 65° F

CALGARY	CORONATION	EDMONTON	EDSON	GR.PRAIRIE	LETHBRIDGE	RED DEER	VERMILION	
453,812	1,311	451,635	4,111	16,618	44,522	30,107	2,969	Population
100,998	796	79,464	1,624	4,800	13,821	9,280	1,926	Area (Acres)
19	30	27	46	46	22	30	28	Snow Load (lb./sq.ft.)
186	165	-	127	285	322	93	118	Miles from Edmonton
-	212	186	285	466	136	90	303	Miles from Calgary
2,121	1,981	2,068	2,195	2,480	2,052	2,211	1,950	Miles from Toronto
2.38	2.53	1.00	2.13	3.28	3.06	1.72	2.13	Cost $/100 lb. Freight from Edmonton (1 Ton)
11.68	11.68	11.73	11.68	11.68	11.68	11.68	11.68	Carpenter Rate Gross/Hr.
12.65	Edmonton	12.68	Edmonton	Edmonton	11.85	12.19	Edmonton	Plumber Rate Gross/Hr.
12.10	Edmonton	12.10	Edmonton	Edmonton	11.83	12.10	Edmonton	Sheet Metal Worker Gross/Hr.
12.37	Edmonton	12.64	Edmonton	Edmonton	Calgary	Edmonton	Edmonton	Electrician Gross/Hr.
12.04	Edmonton	12.14	Edmonton	Edmonton	Calgary	Edmonton	Edmonton	Insulators Gross/Hr.
9.56	Edmonton	9.81	Edmonton	Edmonton	Calgary	Edmonton	Edmonton	Laborers Gross/Hr.
30.15	44.80	28.50	39.00	39.55	27.50	31.00	45.65	3000 lb. Concrete(2000 yds.) 3/4 Agg.$/Yd.
No	Yes	No	Yes	?	No	No	Yes	Labor Living Allowance Required
51.5¢	(75¢) Edmonton	52¢	(70¢) Edmonton	75-80¢	50¢	66¢	(70¢) Edmonton	10,000-8" Concrete Blocks (Not Delivered)

APPENDIX VI
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May 22, 1976

TRANSPORTATION OF STUDENTS

Changing pupil populations make comprehensive school facility planning imperative. Flexibility must be a dominant planning parameter to come to terms with uncertainty. Under the former conditions of steady pupil population growth, time corrected mistakes of overbuilding. Under current conditions of shifting and/or declining pupil population, time accentuates mistakes in school building size or location.

Four important school facility acquisition alternatives have been defined and discussed elsewhere in this report. Each alternative should be assessed each time school facilities are needed. Transportation of students to distant schools and transportation of information to students are options which mitigate the problems of population sparsity.

A large number of authoritative studies (see bibliography) have been carried out to compare the "transported" to the "non-transported" pupil on issues such as:

- health and absenteeism of pupils
- work output
- cognitive characteristics
- affective characteristics
- school sports activities
- school social programs

Furthermore, the attitudes of pupils, teachers, school administration personnel and parents have been carefully surveyed by competent researchers who have stratified opinions for the different grades in both elementary and secondary schools.

Generally speaking, the pupils, the teachers and the school administration personnel are persuaded "transported" students are not at a disadvantage compared to "non-transported" students. Providing adequately supervised lunch-time and leisure time facilities are provided, there is little evidence of bussing having a negative effect on pupil progress. Some parents, however, take a negative stand on bussing, usually on emotional, rather than rational issues.

Bussing is not so much a substitute for more dispersed school buildings as it is a means of coming to terms with sparsity. Bussing is a direct answer to the challenge of sparsely populated pupil areas. It is also a temporary solution to relieve over-crowding and underutilization of schools until adjustments can be made to these facilities.

Decision-making on bussing should be based on an analysis of cost, safety and service. Pupils, teachers and administrative personnel accept bussing as a valid operational alternative for school boards to equalize educational opportunities. The economics of bussing have been thoroughly researched with professional studies (see bibliography) on topics which include the following:

- comparison of board ownership and outside contracts for bussing
- computer programs for bus routing
- administration, planning and operation of bus routes
- funding formulae for bussing
- comparison of alternative methods of providing bussing

In particular, the 1969 work carried out for Alberta Education by Kates, Peat, Marwick on "Study of School Bus Transportation in Calgary and Edmonton" remains relevant.

Cost criteria useful for school board adjudication of bussing operations, whether by the board or through outside contractors, are summarized as follows:

TABLE 8a

PUPIL TRANSPORTATION

COST PER PUPIL ENROLLED
1960 to 1970

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
British Columbia	$ 7.71	$ 7.65	$ 7.58	$ 7.63	$ 7.82	$ 8.26	$ 9.00	$ 9.84	$10.91	$11.48	$12.44
ALBERTA	31.49	31.88	32.14	32.20	33.49	35.00	37.32	40.92	43.84	46.26	47.47
Saskatchewan	27.44	29.70	33.36	35.73	40.95	47.42	50.04	54.08	56.11	56.96	59.29
Manitoba	15.26	16.64	17.20	17.83	19.05	20.91	23.63	28.29	32.90	34.20	36.25
Ontario	9.55	10.27	11.10	11.97	12.92	14.68	16.88	19.19	21.66	26.17	29.24
Quebec	6.15	6.89	8.05	8.81	10.28	16.21	19.68	30.41	34.89	40.77	50.77
New Brunswick	8.76	9.34	9.92	10.00	10.06	11.54	13.47	18.56	23.29	26.76	29.85
Nova Scotia	12.68	14.15	15.22	15.49	16.69	18.80	21.32	22.33	27.27	33.76	33.69
Prince Edward Island	4.66	4.79	5.77	6.80	8.04	21.09	21.87	19.54	22.98	26.83	62.90
Newfoundland	4.56	5.00	5.42	5.45	7.04	7.66	12.19	10.08	14.46	18.49	19.64
Yukon and North West Territories	11.29	17.96	22.94	21.37	27.33	80.32	85.47	92.20	57.59	55.51	21.86
CANADA	11.21	11.95	12.85	13.54	14.82	17.87	20.38	25.06	28.30	32.26	36.71

Note: The calculation is based on the total costs for transportation as defined by the jurisdiction divided by the enrolment of the schools.

Source: Calculations were made from data supplied by Statistics Canada.
Committee on the costs of Education. Interim report #3, Province of Ontario.

Bussing Costs

The cost of operating or providing students with transportation to education facilities is clearly a major area of concern. Costs of operation can vary between school boards depending upon individual circumstances. In fact, the cost between provinces can vary widely as indicated by the table on the opposite page, taken from Ontario Committee on the Cost of Education (1973).

Costs can vary depending on whether the school board owns its buses, or hires private carriers by competitive tenders, negotiation, or by a combination of these methods.

The cost of operating school buses may be conveniently divided into fixed and variable cost sections. Administration, including leisure and lunch-time supervised facilities, and insurance, are examples of relatively fixed costs. Variable costs include the following items:

- financing charges
- depreciation
- gas, oil, tires
- maintenance and repairs
- driver salaries

The cost and capacity of the bus, the number of pupils transported, the length and type of the routes are chief among the factors affecting the variable costs and their identification as follows:

1. The number of miles travelled per year should be taken as the total daily mileage times 180 days. To this mileage should be added 50 miles per year to account for shunting and maintenance mileage.

2. The number of days for which drivers' salaries are paid is 208 per year for both part-time and full-time drivers. An allowance for spare drivers should be made on the basis of one spare driver for each twelve buses. The spare driver will likely be paid three hours per day at the part-time rate just to be on call, and whether or not the person is needed. Statistics indicate that the spare driver is needed 50% of the time. Therefore, with a fleet of twelve buses, the number of hours paid per bus per year would be .5 times (3 ÷ 12) times 180 = 22.5 hours.

3. One spare bus is also needed for each twelve that are in operation.

4. Depreciation. The useful life of the bus depends on the conditions under which it operates. Buses operating over hilly, gravel roads have shorter useful lives than those operating over flat, paved roads. The useful life of a bus becomes less as the number of miles per year increases, and the mathematical relationship between bus life and miles per year can be calculated using regression analysis with an equation based on historical survey data for that particular region.

   Generally the relationship between bus life and miles per year is such that the useful life has an upper limit of eight years for low mileage and the total mileage over the useful life has an upper limit of 150,000 miles.

   Straight line depreciation of the capital cost over the useful life of the bus is normal practice through to zero residual value.

5. Maintenance. The maintenance cost of a bus in a given year depends on the number of miles travelled that year, the cumulative mileage travelled by the bus at the end of that year and the age of the bus at the end of that year.

6. Drivers' salaries. The number of hours for which drivers are entitled to be paid can be computed by dividing the daily mileage by the average speed and adding .75 hours for paid non-driving time for two cycles per day and .5 hours for paid non-driving time for three cycles per day. Thirteen miles per hour is an appropriate speed estimate for city driving conditions and 30 miles per hour for rural highways and expressways. From the daily hours determined, multiply by the part-time rate if the number of hours per driver is less than five and the full-time rate if it is greater than five. Fringe benefits must then be added as follows:

   - workmen's compensation
   - unemployment insurance
   - social security
   - health insurance
   - vacation pay

   (If these total between 8% and 10% of the wage paid.)

7. School boards must assure themselves that adequate insurance coverage is in place on bussing activities. Fleet discounts and special discounts for accident-free history should be carefully investigated.

8. Administration. Bussing is attended by the following elements of administrative expense:

- pupil supervision at lunch and leisure time
- administrative salaries
- office supplies, telephone and utilities
- advertising of bus schedules
- taxes
- security
- parking

Transportation of students has been effectively planned and administered by Alberta Education and the school boards throughout the province. The Alberta School Foundation program recognizes bussing costs through a grant formula to equalize school accessibility. This recognition remains valid, particularly in sparsely populated areas.

Measurements defining sparsity include the following:

- pupil - teacher ratios for both the total school board district and for each school
- pupil - space ratios
- acres per pupil
- mean distance between schools

In addition to the pedagogical challenges of geography presented by sparsely populated areas for school accommodation there are other significant challenges associated with scattered schools. There are, great opportunities for these schools to serve a scattered population as a community centre for pedagogical and community based activities. For instance, school bus fleets, having delivered the pupils, could become a dial-a-bus transportation system for elderly and handicapped people of the area during school hours.

A further extension of student transportation, which, because of cost, would only be considered for isolated cases, is a subsidized living allowance for students to travel from very remote homes and live away from home nearer to facilities offering senior high school programs for which they are qualified.

The important question of safety is discussed next.

Safety Needs

The prime consideration in the provision of student transportation is the need for safety. In early years, not a great deal of attention was paid to vehicle standards and driver selection. However, with the transporting of students over longer distances, often over difficult terrain, in all types of weather, on high-speed highways as well as rural roads, safety takes on a new importance. Each school board should develop stringent criteria for the selection of the vehicle used, the equipment and standards - particularly driver standards - they should maintain, and regularly monitor these.

The desire for safe school transit is of such importance that the Ontario Committee on the Costs of Education in their interim report #3 (1973) dealing with pupil transportation, made the following recommendation:

> "that the Ministry of Education initiate discussions with the Ministry of Transportation and Communications for the purpose of having a study established to examine all matters relating to the safety of pupils for whom transportation is provided by school boards. In addition to soliciting the expert advice of safety and traffic engineers, the body responsible for the study should seek the assistance of school boards, school bus operators, school bus manufacturers, consumer groups, and other interested organizations. The results of the study, including information about the costs to provide safety improvements, should be made available to school boards, Government departments, and the general public so that they will be in a position to decide the priorities they wish to establish."

Many school boards have, in fact, developed safety policies and procedures which must be adhered to during pupil transportation. Most provinces have minimum standards that a vehicle used in transporting students must meet. If the school board wants to go beyond these, it is advised to contact the Canadian Standards Association for help in developing higher standards. Undoubtedly, the higher the standards which are required the greater the per pupil cost of transportation. This is an aspect which will have to be evaluated by each board. However, once a standard is established it must apply to all vehicles within the board so that uniform safety and service can be provided to all students.

Many school boards have developed a checklist of activities which a driver must perform each day before taking on passengers. At the end of the day the driver signs a form confirming that all activities have been performed. The maintenance of buses is, of course, important to many school boards who have established a schedule of regular mechanical checks as well as periodic spot checks to insure that standards are maintained.

Driver selection along with standards of competence and health must be established and maintained. Many school boards contract student transportation to outside firms and the school board must be satisfied that the drivers meet the required standards. In Ontario, drivers of school transportation must pass a special driving examination taken in a school bus. They must also pass rules of the road and sign recognition tests and have knowledge of bus and equipment maintenance and safety and passenger control. This test must be retaken every three years along with physical fitness and vision tests, and every year for drivers over 65 years of age. The driver is the key to bus safety, thus he must be aware of the rules of the road as well as the board's policies.

The route that the bus follows in picking up or discharging its pupils should be a safe one. Potential hazards such as heavy traffic at pick-up and transfer points, as well as the actual conditions of the road itself, should be reviewed. Here again, the board should consider a series of spot checks on the actual operation of the route.

Passenger conduct as it affects safety is important. The school board should develop a set of guidelines pertaining to conduct of students on buses and ensure that all students, drivers and parents are aware of the policy. Disciplinary procedures and courses of action to be taken under various conditions should be outlined and followed. Most school boards regard riding on a school bus a privilege not a right and will prohibit students who repeatedly create disturbances on buses from using them.

So that all those who use student transportation are aware of the rules of operation and safety, periodic seminars for the drivers should be held and occasional reminders made to the students on expected behaviour. The degree of frequency can vary depending on how often there is a change in the persons driving or using the facilities.

Lastly, because accidents will, on occasion, happen despite all efforts to avoid them, the school board should have adequate insurance and be fully aware of its liabilities. If independent carriers are used then the school board should have a record of their insurance coverage and determine that it is in force at all times.

The last subject for discussion is Service.

Service Levels

School transportation is not currently considered a right of every student but rather a privilege accorded to students who have difficulty getting to and from school. Therefore, to avoid inequities and limit complaints, it is important that the local boards develop clearly stated policies with respect to:

a) those who are eligible for service, and

b) the types and limits of service to be provided.

The basis for eligibility for receiving student transportation can depend on many factors: age of student, distance to or from school, weather conditions, road conditions or the state of the areas to be travelled to reach the school, availability of public transit or special needs.

In general, urban students do not require bussing to the extent that rural students do, and similarly, older students can be expected to walk farther to school than younger students.

The following general types of guidelines are applied for eligibility within the Peel Board of Education in Ontario:

- If over two miles to school, all students of all ages will be bussed.
- All students up to 10 years of age will be bussed during December, January, February and March.
- If students have to walk along a highway where speeds exceed 30 m.p.h. they will be bussed.
- If students have to walk past wide open spaces or an area considered a safety hazard they will be bussed.

The distance criteria is the one which seems to vary the most among the various boards of education. Criteria may dictate that eligible students living beyond a specified distance (i.e. 1.5 or 2 miles) will be bussed. This criteria is sometimes developed in greater detail:

Bussing is provided for eligible pupils living beyond the following distances from the school:

Elementary School Students	1.5 miles
Junior School Students	2 miles
Senior School Students	3 miles

Within urban areas, school bussing may not be provided if public transit is available. Instead, the board may choose to provide subsidized public transit tickets to the students.

Special rules of eligibility may apply to students with a mental or physical handicap. Similarly, specially equipped transportation vehicles may have to be provided.

The level of service to be provided to eligible students is important. Policies must be developed and communicated to all concerned regarding the following:

a) Maximum distance that children should walk to and from bus stops or pick-up points.

b) Pick-up and drop-off times at the bus stops and at school.

c) Maximum length of time students should spend on the bus.

d) Maximum bus loadings.

e) Transfers.

f) Combining routes.

g) Cancellation of service.

The maximum distance students should walk to and from the pick-up point should be considered in the same manner as eligibility for bussing. Consideration of this aspect should include waiting time, length of time getting to pick-up point plus time on bus, conditions of the road and availability of shelter.

Pick-up and drop-off times should be established with regard to the age of the children, time of arrival at school and departure.

Students should not have to spend too much time on the bus. Routes should be established which allow for the first on the bus in the morning to be first off at night. Time on the bus must also be considered when locating new schools. In remote areas of Ontario and Manitoba, smaller schools are built to prevent elementary students from spending too long on buses. In extreme cases, students must spend up to 1-1/2 hours on the bus.

Maximum bus loading policy should be determined. Some jurisdictions set standards that prohibit more than 1/3 of the passengers from standing. Ideally, however, no students should have to stand, and at the very least, all of the junior students should be provided with seats.

Transferring from one bus to another is inconvenient and may reduce the level of service. However, it may be necessary and in these cases the board should have firm guidelines and procedures under which transfers can take place.

For the sake of economy, it may be necessary to combine routes. There should be a method of communicating this to reduce inconvenience. Similarly predetermined policies should be developed as to when service will be cancelled (for example, weather conditions) so that those effected will know without having to be informed.

Service surveys should be carried out four times a year to determine that the expected level of service has been established and is being maintained. A survey should be carried out in September, the first week after school openings, to determine if there are any problems. A second survey at the end of September will determine if problems have been corrected. Additional surveys should be made after the first major snowfall to determine its effect on students getting to school and its impact on timing, and finally in late January to determine that no new problems have arisen.

In the previous discussions, reference has been made to guidelines to be set by the school boards which would apply to cost, safety and service. Ideally, the province would set minimum standards which all school boards must meet and grant funds to the boards on the basis of these standards. If a school board decided to exceed the guidelines, it would do so at its own discretion.

APPENDIX VIII

TRANSPORTATION OF INFORMATION

Transportation of information to students as an alternative to transporting students to information sources, has been limited in the past to correspondence courses by mail.

The Alberta Correspondence School presently serves about 20,000 students each year, 90% of whom are taking high school courses.

Broadcasting by radio and television, and narrowcasting by broadband coaxial cable are new alternatives for the delivery of information. These new electronic transport systems hold the same promise as the road transport systems did in the 1920's.

The two communications satellites (Anik) circling the earth 26,000 miles above Calgary, place all of Canada under these electronic mirrors and northern Alberta is particularly well covered!

Transportation of information, even with the great capacity of the electronic transport systems, is not a school building alternative, but it might well be an alternative to building a laboratory within a school or locally providing other specialized facilities and instructors.

The use of educational television (ETV) in schools, to supplement classroom lectures has not been an enduring success to date. The Ottawa school board had a frustrating series of experiences with ETV for classrooms. In a wave of enthusiasm, the Ottawa Public School Board commenced closed-circuit telecasting to each of their school in 1966. Furthermore, Ottawa Cablevision Limited and Skyline Cablevision Limited carried much of the videotaped programming to the cable television subscribers in Ottawa. The broadcasts failed in their purpose for reasons which include the following:

a) The studio at 605 Bronson Avenue, Ottawa, was poorly equipped with used black-and-white cameras. The studio was not adequately staffed with either production or electronic technicians.

b) One hundred programs a year were produced in the Ottawa ETV studios and many were well done. However, the programs seemed to invoke endless academic debate. Teachers receiving the programs in their classrooms were critical of the substance and methods of the broadcasts.

c) The greatest difficulty was the timing and distribution of programs to classrooms. The ultimate use of videotapes was found to be a better method of distribution than common distribution over the closed-circuit system.

The Ottawa School Board discontinued closed-circuit ETV programming in favour of over-the-air broadcasting through the Ontario Education Communications Authority, Channel 19 UHF transmitter in 1975.

The Ontario Education Communications Authority currently has a budget of about $12 million per year and a staff of some 350 educators producers, writers, researchers and technicians. Its main broadcasting medium is Channel 19, which has transmitters serving Toronto, Ottawa and Sudbury. A large number of cable television companies use five-hour packages of Channel 19 programming supplied on videotape. Some 7,000 audio tapes and 400 videotapes are available from OECA for educational programming.

In 1967, the Scarborough College of the University of Toronto made a very earnest effort to provide on-campus lectures with videotapes. A full-scale attempt was made to spread ETV across the country and strong financial support attended the experiment. The results were less than satisfactory. When students make an effort to appear on campus in the Canadian climate, they expect the teacher and some resource personnel to be there as well. Psychologically, students do not seem prepared to accept televised instructional programs as the principal methodology on campus or at school. Adult education, which should be the fastest growing industry in Canada in the next decade, is not the subject of this report, but it is probably the area in which ETV can play its greatest role. An adult who can return home from work and receive a televised course for academic credit in his own living room is delighted. ETV can, therefore, overcome the usual restraints to adult education, which are economic, geographic, educational status and motivation.

In Quebec, the government has set up Radio Quebec, with some responsibilities for educational programming. La Regie des Services Publiques, for instance, will not issue licences to cable television companies without specific provisions for educational channels.

In 1971, the Government of the Province of Alberta established the Alberta Educational Communications Authority. Radio Station CKUA and the experimental educational projects of Edmonton and Calgary (META and CARET) were absorbed by the new corporation into a functional activity known as ACCESS.

Educational institutions throughout the province can produce their own programs in colour under the guidance of the Alberta Educational Communications Authority. Two excellent colour studios have been established, one in Calgary and one in Edmonton, and President Shorter, of the Alberta Educational Communications Authority has a competent staff of producers and technicians to assist educators and school boards in audio and audio visual productions. Programs are produced for both in-school classroom use and for use in the community at large.

The open university is a concept which is working extremely well in Great Britain and is currently being measured at Ryerson Polytechnical Institute in Toronto, the University of Toronto, and the University of Waterloo. The success of the open university in Great Britain and of the Children's Television Workshop production "Sesame Street" proves that ETV can and does work for a wide spectrum of pupil age groups.

In a paper entitled "Educational Television", by Mr. L.T. Shorter, in 1964, for the trustees of Kamloops School District No. 24, an excellent analysis of learning experiences in the United States through educational television is provided. Working Paper No. 6 from the Educational Facilities Laboratory Incorporated of New York City on "Cables, Cameras and Schools" issued in May 1974, updates the trend of educational television and confirms that when properly done, it is effective. In some cases, such as home bound students, it is by far the best way of providing instruction.

The next step for the cable television industry will be to move from interconnection with subscribers to interaction with subscribers. This two-way capability will make it possible for home bound students to react with a home terminal to the teacher providing the televised lesson in much the same way a classroom student can react to classroom instruction.

The broadband coaxial cable is literally a throughway into the home. Twenty-eight television channels are currently provided for standard home television receivers by a number of Canadian cable companies. Programming can be individually addressed and the Rand Corporation of California suggests that within the next twenty years, mail will be delivered via cable television. The electronic transport systems for knowledge and information should be kept in mind in the planning process of school facilities. At the present time, it can stretch the educational investment dollar a little further through bringing specialized programming packages to specialized groups of students. For instance, it can let everyone look through a microscope at the same time during a highly specialized experiment being carried out in one place. It lets a school share its best teachers now and then throughout the school district or even across the province. The electronic transport system provides opportunities for planning that were not previously available. It allows for re-deployment of specialized facilities and specialized teachers and the practical applications of educational television are just beginning to develop.

APPENDIX IX

REFERENCES - BUILDING ALTERNATIVES

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THEORETICAL BACKGROUND TO FUNDING CONSIDERATIONS

The principal theoretical factors which should be considered when formulating educational funding policies and mechanisms are outlined in this appendix. In essence, the appendix represents a brief synopsis of the considerable literature pertaining to the development of the more prevalent funding theories and financing methods being followed today. Most of the existing literature deals primarily with the provision of operating funds although the same considerations may, for the most part, also be applied equally to capital funding requirements.

The main factors, all of which were considered carefully when identifying and developing the funding mechanism alternatives presented in this report, may be classified broadly as:

A. Level of Funds
B. Timing of Funds
C. Sharing of Funds
D. Source of Funds

A. LEVEL OF FUNDS

In Canada the level of provincial funding of school construction falls into essentially three categories:

- funding by a fixed percentage of actual or standard cost or fixed square footage allowance,
- funding by a variable percentage of cost or variable square footage allowance, and
- full funding.

The advantages and disadvantages of each type of funding level are discussed below.

1. Partial Funding by a Fixed Percentage of Actual or Standard Cost or Fixed Square Footage Allowance

Advantages

1. Local boards are more cost conscious since the local community will have to fund excess costs.
2. After cost estimates or square footage requirements are known provincially, the provincial capital budget can be ascertained with less effort and likely more accuracy than with other funding methods.
3. Provincial administration regarding capital costs is relatively easy.

Disadvantages

1. Due to disparities in local tax bases and construction costs, local boards may experience considerable difficulties in funding costs above the support level. This can promote inequalities in educational opportunities.
2. Communities with low taxes bases or high construction costs or both could be faced with a far heavier municipal tax burden than other provincial communities.

2. Partial Funding by Variable Percentage or Variable Square Footage Allowances

Advantage

1. Local disparities in tax base and construction costs can be taken into account, thereby equalizing tax burdens and quality of educational facilities.

Disadvantages

1. Administratively this type of funding is more complex in that the level of allowance must be continually updated for local tax base and construction cost disparities.
2. High local municipal tax rates can still occur if the adjustment to reflect disparities does not entirely remove the effect of small tax bases and high construction costs.

3. Full Funding

Advantage

1. Local disparities relating to size of tax base and construction costs are completely removed thereby tending to equalize educational opportunities.

Disadvantages

1. Local initiative to reduce costs and thereby control local tax increases are absent.
2. Since no local costs are involved in capital programs, demand for such programs can increase, requiring extensive analysis and provincial control to avoid excess spending.

As can be seen from the above summary and table, equality of education, from the capital facilities standpoint, increases as the variability and extent of provincial funding increases. On the other hand, increases in the variability and extent of provincial funding lead to more complex provincial budgeting and control problems with a corresponding decrease in the incentive of local boards to be cost conscious.

B. TIMING OF FUNDS

One of, or a combination of, three methods of payment timing can be used for school construction - funds accumulated for future construction, pay as you go financing, and debt financing. The advantages and disadvantages of each of these methods are discussed below.

1. Funding by Way of Capital Accumulation for Future Construction

Advantages

1. The necessary costs can be spread equally over a number of years thus establishing a degree of certainty for taxpayers regarding their future tax bills.
2. Interest revenue on funds accumulated will increase the amount of funding available for future construction.

Disadvantages

1. Extensive projections on a long-term basis must be made to determine the amount of funding that will be required in future years. This total amount must then be converted to annualized capital acquisition programs which must account for interest accumulation rates and changing tax bases and construction costs.
2. By removing funds from the private sector prior to their actual requirement, the private sector is not permitted to invest these funds in what might be considered by that sector as a more valuable investment opportunity. Opposition to this type of funding might be high.

3. Rising construction costs because of inflationary pressures mean that funds accumulated will not have the same value as when they were originally acquired.
4. Opposition might be mounted toward the concept of the current generation paying for costs which will only benefit future generations which this method of capital accumulation implies.

2. Pay as You Go Financing

Advantages

1. Administratively this type of financing is relatively simple in that no capital accumulation plans or debt issue and retirement plans are necessary.
2. Costs will be more closely controlled because of the difficulty in acquiring funds.

Disadvantages

1. The large amount of funds required for capital construction may create an unduly heavy burden in any one year.
2. The difficulties of raising money for capital construction may restrict school construction to such a degree that disparities in educational facilities and opportunities may appear.
3. A fluctuating tax rate due to differences in need for capital construction from year to year leads to instability in financial tax planning particularly for those on whom the tax liability would fall.

3. Debt Financing

Advantages

1. Future budgeting is relatively simple since the amount of funds required for repayment of the debt can be readily calculated from year to year.
2. Future dollars, reduced in value by inflation, are used to pay for current construction.
3. The liability for the capital project financing will fall at least partially on those taking advantage of the facilities for their education.

Disadvantages

1. Interest costs on the amount financed can easily double the total cost of the facilities.
2. Availability of capital is determined normally by the interest rate offered and general economic conditions. One or both of high interest rates or a shortage in investment capital due to economic conditions, can increase the overall cost of capital construction.

C. SHARING OF FUNDS

Supplementary areas, where allowed, normally have to be financed from current revenue or by grants from other community groups. Many school areas allow community groups to utilize "normal" school facilities on a free or rental basis. Rents are frequently minor in amount. Facilities could also be shared with other than community groups although the sharing of school facilities with commercial interests is not prevalent in Canada at the present time. The sharing of facilities has many advantages and disadvantages - both financial and otherwise - some of which are as follows:

Advantages

1. If the facilities are built with education funds and leased to other commercial or community groups, the lease income can be used to offset capital costs and operating costs. Normally, however, lease income would be nominal in comparison to total costs. Similarly, if the capital cost is shared at the outset, the capital cost for the shared facilities would normally be reduced to each user.
2. The total cost to taxpayers of community facilities can be reduced through construction of multi-use facilities. Depending upon the method of cost sharing, both the community and the Department of Education should benefit financially.
3. In an area where future growth is projected, the physical plant may be built initially to serve the enrolment growth without excess cost providing the excess facilities can be leased partially to other organizations or commercial entities until they are required for education purposes.
4. Community needs might be met by shared facilities where they would not be satisfied otherwise due to the high cost of separate facilities.

Disadvantages

1. If a school property were to become surplus for educational purposes, difficulties in disposition could arise, particularly where another group has shared in the capital cost of the project or where a long-term lease is involved.
2. Should a sharing organization fail to meet its debt service or lease obligations, education funds might be required to cover these obligations.
3. The planning of multi-use facilities is necessarily more complex and time consuming.

D. SOURCE OF FUNDS

Funds for education may originate from the public through one or more taxation alternatives or may be provided from private sources.

1. Public Funds

Capital construction for education must rely, for the most part, on revenues raised by direct or indirect taxation to either fund current or future construction or for debt services for past construction.

Taxes are normally discussed in terms of whether or not they are regressive, proportional or progressive. Current popular opinion in Canada regards a progressive tax structure as the most appropriate type of taxation system. A progressive tax requires that a person earning more money or having more wealth will pay a larger percentage of his income or wealth in taxes than would a person with a smaller income or lower amount of wealth. A proportional tax would mean that all people pay the same percentage of their income or wealth as a tax. Regression taxes, on the other hand, are those requiring a low income or low wealth person to pay a larger percentage of his income or wealth in taxes than a person with a high income or wealth.

Capital funding for school construction in Canada comes from a variety of taxation sources. On a local level, the most usual form of taxation is the property tax. The provincial share is usually derived from general tax revenues which for the most part, come from income taxes and retail sales tax. Some provinces specifically use sales taxes to finance health and education services. Set out below are the advantages and disadvantages of several types of taxation methods as these apply to education capital construction funding.

a) Advantages and Disadvantages of Various Taxation Methods for School Construction Funding

i) Tax on Income - Personal and Corporate

Advantages

1. This is a progressive tax which is proportionately higher for higher incomes.
2. Regional income disparities are taken into account by the nature of the tax and since it is collected provincially any further disparities can be taken into account by the province as part of the disbursing process.
3. The tax collection mechanism is already established in all provinces, in most cases by a tax collection sharing arrangement with the federal government.
4. Taxable incomes normally expand with increases in economic activity and population thus keeping pace to a degree with the need for new school facilities.

Disadvantages

1. This type of tax is not practicable at the municipal level. Accordingly, if school construction financing is to be a municipal responsibility a method of disbursing provincial tax collections back to the municipal governments on an equitable basis must be developed.

2. Taxable incomes are subject to economic downturns. Accordingly, revenues might decrease in years where there is a requirement for construction funding for either past, present or future construction. This can lead to an imbalance between supply and demand for funds in any given year.

3. Income taxes are frequently used as an economic control. A lowering of tax rates to stimulate the economy might cause difficulties in financing school construction which requires a reasonably stable supply of funds particularly for debt retirement.

ii) Property Tax

Advantages

1. A constant tax base is used, thus ensuring a reasonably steady income stream without variation in tax rate.

2. This tax is normally collected at the municipal or local level which is advantageous if the local government is to be responsible for school construction funding.

3. As demand is created in a given area through new housing the tax base increases in the same area.

Disadvantages

1. If the property tax were the only source of capital funding, regional disparities are likely to occur. In particular, disparities are revealed in the urban vs. rural localities and the industrial vs. urban areas. "Bedroom" communities would be faced with high education demands whereas neighbouring industrialized communities may have little or no demand for education. These regional disparities can be overcome by equalization grants, however, the grants would have to come from other provincial sources or from a provincially administered pool of municipal tax funds to which all municipalities would contribute.

2. Property taxes are proportional to the physical asset, however, they are regressive in terms of the wealth and income of the owner. A property is taxed on the same basis as a neighbouring property regardless of whether one property is wholly owned and the other is almost entirely debt-financed. Similarly, the income of the owner is not taken into account. The latter disparity can be minimized by a system of municipal tax credits.

3. The value of the tax base must be continually updated particularly as new construction takes place to prevent inequities of assessment of old versus new properties.

4. Many different tax assessors are normally involved across a province in assessing municipal values. These assessments, even with exacting guidelines, are subjective to a degree, thus resulting in disparities in assessment.

iii) Retail Sales Tax

Advantages

1. A large tax base is used which, although it fluctuates with economic changes, is sufficiently large and all encompassing that a reasonably steady flow of funds is produced.

2. The tax is normally collected at the provincial level and can be distributed in a manner designed to eliminate regional cost disparities.

Disadvantages

1. The tax is proportional by tax base but is regressive in terms of ability to pay.

2. The tax collection normally involves all people or businesses making retail sales. Although the collection cost is relatively small in the public sector, the private sector cost can be considerable in terms of extra clerical and accounting time and new machines (cash register) needed to compute and record the tax.

3. Alberta does not presently collect a retail sales tax. Therefore, the administrative machinery required is not already established.

iv) Other Taxes

Other common provincial forms of taxation such as gasoline taxes, luxury taxes, succession duties and corporate capital taxes are either not collected presently in Alberta or are identified with specific uses. It does not appear to be appropriate to consider these as major tax sources for financing school construction.

2. Private Capital Sources

Development Levies

Development levies, lot levies and cash imposts are some of the terms which have been used to describe the lump-sum contributions which developers in some jurisdictions have been required to make to their host municipality, as part of many subdivision agreements, in addition to providing or paying for the installation of specified municipal services. Numerous approaches have been taken, including per capita fees, frontage fees, per lot fees, and area fees etc.

Development levies are a relatively new source of funds to municipalities. They have become increasingly popular in certain jurisdictions, particularly in Ontario. A brief discussion of the Ontario experience is presented as background to consideration of this alternative as an interesting possibility for Alberta, where the pressure for new schools originates largely in new subdivisions of the major urban centres.

Development levies in Ontario began to take on significance in the early post-war years, as many municipalities found they could not keep up with the costs of rapid growth. Initially, the level of these imposts was based on the provision of "hard" services such as trunk roads and sewers. Many municipalities now include the provision of virtually all "hard" services and many "soft" services, for example, parkland development, recreational facilities, library services and bus stop shelters, or do not specify the purpose of the levy.

Many municipalities have found development levies to be a relatively easy way to raise capital for public works. In a 1959 survey of Ontario municipalities,(1) the highest levy reported was $400 per lot; by 1973 this had risen to $1,500 per lot; some municipalities in Ontario now levy $5,000 per lot, and regional governments frequently impose a separate levy on top of that set by the municipality. Proposals to increase lot levies in the city of Mississauga to approximately $3,764 for a single family dwelling plus the regional assessment of approximately $1,638 for a total of $5,400 have met stiff opposition from builders who indicate that these levies will restrict future housing growth in these areas. It is possible that these increased levies might have to be taken before the Ontario Municipal Board for approval before they can be implemented.

In Ontario, development levies are very much at the discretion of the municipality. The Municipal Act (Section 309) gives municipalities the right to impose such levies but does not provide for any restriction on the amount or method of computing them. As a result, there has been concern over actual or possible abuses by municipalities. In addition to requests and briefs from various sources over the past several years, the Ontario Committee on Taxation found levies to be open to abuse and stated that:

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(1) Municipal Cash Imposts in Ontario; prepared for the Ontario Housing Advisory Committee by Clayton Research Associates, 1973.

> "We deem it unreasonable to finance through developers services beyond the physical installations needed to open up subdivisions and the land required for public purposes by each subdivision. Specifically, we fail to see that cash imposts are warranted except as permitted contributions toward the cost of physical service installations. We therefore recommend that: cash imposts on developers for unspecified purposes, or for purposes other than the recovery of the cost of allowable municipal service installations or extensions, be prohibited".(2)

Development levies are a form of taxation, in that they raise funds to support public expenditures. As such, they are an inefficient and regressive tax. Because these costs are usually passed on to the home-buyer, he eventually finances them through his mortgage at higher interest rates than would apply to municipal debt which could be supported through realty taxes. Their impact on housing prices is such that, frequently, those least able to bear the tax burden must absorb the cost. Furthermore, their effect on the supply and cost of housing can often act against the general public interest.

These implications were recognized by the Ontario Housing Advisory Committee which recommended that temporary measures should be put into force by the Province to limit impost charges to the recovery of costs which bear directly on new developments. It further recommended that comprehensive legislation be passed regarding the extent of cash imposts and that consideration should be given to the eventual elimination of cash imposts entirely. It is interesting to note that many municipal officials would candidly admit that they also find cash imposts to be an undesirable method of financing. The shortage of alternate funding for various municipal services is, of course, a strong reason for the retention of this type of funding as an option to municipalities.

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(2) The Ontario Committee on Taxation Report; Volume II; Toronto; The Queen's Printer, 1967.

The shortage of adequate alternative funding for services is brought out in a study done by the Clayton Research Associates for the Ontario Housing Advisory Committee. This study was published in December of 1973 under the title "Municipal Cash Imposts in Ontario". A review of the case histories of eight municipalities indicated that the original motive for cash imposts was to help finance the construction of sewer and water facilities in some areas and to finance general capital expenditures in other areas. The rationale behind levying imposts has remained unchanged in some municipalities but the level of impost has increased in all cases - in some situations moderately and in others markedly. In Burlington, for example, the cash impost on apartment buildings of four stories or more increased by 400% from 1968 to 1973.

Land Dedication by Developers

Certain land costs can be funded successfully by methods other than cash lot levies. In some centres, land developers are required to set aside a certain amount of land in each new development for new schools. This land is normally sold at a reduced value to the school authorities. The requirements that land be made available in this manner assures the education authorities of an available school site in an area where there is likely to be a demand for school facilities - in fact, if each developer of a subdivision is required to make land available in this manner a surplus of land might easily occur due to more than one subdivision sharing a facility. This very fact has been recognized by Alberta Education in their publication "Brief Towards a New Planning Act for Alberta" published in January 1975 in which it is recommended that school boards be involved in the subdivision planning stage and be able to buy, sell or trade school site facilities in new subdivisions.

If land is donated to the school authorities, the cost thereof is borne by the developer. If the land is sold at a reduced value to the school board, the decreased selling price as compared to the fair market value is still reflected in the profits of the developer. Regardless of which of these two methods is employed, the cost or decrease in selling value is normally passed on to the homebuyer through an increased lot price. Partial financing of school construction by this method, therefore, has a direct impact on the cost of housing and, therefore, the provincial housing policies.